

100'S
OF TIPS
FOR PC USERS

COMPUTE

Magazine's

Power Tips

The Editors
and Readers of
COMPUTE

100's of hints
and tips you can
use immediately.



COMPUTE Magazine's Power Tips

The Editors and Readers of COMPUTE

COMPUTE Books

Greensboro, North Carolina

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Chapter 1

DOS Basics

This chapter provides some useful tips for dealing with DOS—how to deal with it, how to deal without it, how to play tricks on it to get it to do what you want.

In this chapter you'll learn how to

- Deal with a hard disk that won't boot
- Get back deleted files
- Eliminate error messages
- Avoid confirming messages
- Make DOS access files faster
- Find out if you have fragmented files
- Access a directory with a space in its name

Boot-Up Blues

Occasionally, something goes wrong with the hard drive's crucial boot data, and the hard drive thinks it's a nonbootable device.

A system floppy is often all it takes to get you back in operation, but I'm willing to bet you'd have trouble laying your hands on a bootable floppy in a pinch. If you do have a bootable floppy, are you sure it holds the current DOS version?

If your bootable floppy is either nonexistent or outdated, take a couple of minutes to create one now using the DOS FORMAT command. Insert a new floppy in drive A: and enter `FORMAT A: /S`. This operation formats the disk and copies `COMMAND.COM` and the hidden DOS system files to it.

An added benefit to a bootable disk loaded with all of your favorite utilities is that it comes in handy when you need to use someone else's computer temporarily. Working on an unfamiliar system can be much friendlier if you have access to at least a few of your usual tools. So format that bootable floppy and stash it where you can always find it.

Tony Roberts

IntroDOS

A Better Bootable Floppy

With your new bootable floppy you're in good shape if trouble arises, but if you want to be even better prepared, copy `SYS.COM` and `CHKDSK.EXE` to the disk along with a small text editor and as many of your favorite disk tools as will fit.

If your hard disk ever fails to perform, boot from the floppy and see if you can access the files on the hard disk. If the hard disk is accessible, switch to the C: drive and run `CHKDSK` to verify that the data on the drive is intact. If `CHKDSK` runs clean, you can then run `AUTOEXEC.BAT` and go about your normal business.

Tony Roberts

IntroDOS

Bootable DOS 5.0 Floppy

The DOS 5.0 that most of you bought was only an upgrade kit; none of the DOS 5.0 distribution disks are bootable.

That means that if your hard disk won't boot for some reason, you won't have a floppy to boot from in case of an emergency. So make a bootable floppy now, while you're thinking about it. Just type `FORMAT A:/S`.

Mark Minasi

Getting Started with DOS

Making Your Hard Disk Bootable Again

Making repairs to a hard disk that refuses to boot is usually relatively easy, but the approach depends on the reason for the failure. If `COMMAND.COM` on drive C: is missing or mangled, simply copy a fresh version from your floppy disk. Be certain that the DOS versions on your hard and floppy disks are the same; `COMMAND.COM` doesn't work very well in mix-and-match mode.

Similarly, DOS's hidden files, if damaged, could prevent boot-up. To copy new versions of these files to your hard disk, use the `SYS C:` command after booting with your floppy.

Another possible reason for failure is that something in your `CONFIG.SYS` file causes the system to hang before it ever gives you control. If you've added a new driver or recently edited `CONFIG.SYS`, consider this possibility.

One way to isolate such a problem is to rebuild `CONFIG.SYS` a line at a time until you see what causes the system to stumble. In one odd case I worked on, I finally discovered that the system hung up during the load of the `ANSI.SYS` device driver. I couldn't figure out why such a ubiquitous device driver would cause a problem until I noticed that the `ANSI.SYS` file was half its normal length. Once I replaced it with a whole copy from the DOS disks, the problem was solved.

A less easily explainable problem occurs when the hard disk's boot sector suddenly goes bad. Although rare, this problem has bothered me on a few occasions. Each time I thought that an entire hard disk reformat was in the offing, but I always found an easier solution using one of the disk-repair utilities, such as Norton's Disk Doctor or PC Tools Diskfix.

Tony Roberts
IntroDOS

Not-So-Picky DOS

Compared to other versions, DOS 5.0 is less picky about what it needs to boot.

Previous versions of DOS needed the hidden files right at the top of the root directory, and the files had to be in the first few clusters. All DOS 5.0 requires is that the files be somewhere in the root directory—which is one rea-

son why it's so easy to install DOS 5.0 on a machine that's already running DOS.

Mark Minasi

Getting Started with DOS

Get Rid of That Old DOS

Use DELOLDOS to free up additional space. If you're sure you like DOS 5.0—and most of us are—then get rid of the old version of DOS that's still on your disk.

That's right, DOS 5.0 keeps your old DOS on the hard disk, just in case you want to uninstall DOS 5.0 and return to your old DOS. A nice touch, but I'm sold on 5.0. I don't need the old DOS around. Just type DELOLDOS, and DOS 5.0 will erase the remaining parts of your old version of DOS, freeing up some hard disk space.

Mark Minasi

Getting Started with DOS

Your First Ten DOS Commands

DOS can be a bit scary when you first see the C> prompt. And when you look in the DOS manual and find over 60 different DOS commands, it's enough to make you want to turn off your computer. Not to worry. You can take care of nearly all your DOS needs with just ten commands and a dozen or so option switches. So stop complaining about how difficult DOS is—you're about to become an instant expert.

CD. (Change Directory) Changes to specified directory.

Use:

`cd drive\path`

Example:

`cd c:\dos\util`

CHKDSK. (Check Disk) Checks the status of a disk.

Use:

chkdsk *drive\filename*

Switches:

/V (displays path and file name of each checked file and directory)

/F (corrects allocation errors if found)

Example:

chkdsk c:\ /F

COPY. Copies one or more files from one disk to another. If the path or filename is omitted for the target drive, COPY will default to the same path or filename that was designated on the source drive. If only the drive letter is specified on the target drive, COPY will default to the current directory.

To save time, you can use an asterisk (*) as a wildcard. C:\WORD*.TXT includes all the files in the WORD directory with names that end in .TXT. C:\WORD*.* includes all the files in the WORD directory. A:*. * includes all the files in the root directory of A:

Use:

copy *source target*

Switch:

/V (verifies copy)

Examples:

copy c:\word\memo.txt a:\word\notes.doc

copy c:\word*.* a:\memos\

copy a:*. * b: /v

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DIR. (Directory) Displays a directory listing for one or more files. If a filename isn't specified, DIR will default to all files in the current directory. Like the COPY command, the DIR command accepts wildcards designated with an asterisk (*).

Use:

`dir filename`

Switches:

`/W` (provides wide display)

`/P` (pauses between screens)

`/S` (includes subdirectories of current directory; DOS 5.0 only)

`/ON` (sorts by name; DOS 5.0 only)

`/OD` (sorts by date; DOS 5.0 only)

`/O-S` (sorts by size, largest files first; DOS 5.0 only)

Examples:

`dir *.txt`

`dir c:\dos*. * /w /p`

`dir /on`

DISKCOPY. Makes a copy of a disk. With DOS 4.0 and higher, DISKCOPY will automatically format your target disk, if necessary.

Use:

`diskcopy source target`

Example:

`diskcopy a: b:`

ERASE. Erases one or more files. Like the COPY command, ERASE accepts wildcards designated with an asterisk (*).

Use:

`erase filename`

Switch:

`/P` (prompts before erasing)

Examples:

`erase c:\word\memo.txt`

`erase *. * /p`

FORMAT. Prepares a disk for DOS.

Use:

`format drive`

Switches:

`/S` (creates a DOS system disk)

`/V:name` (assigns a volume name to the disk)

`/B` (reserves space for DOS system files)

Example:

`format a: /v:memos /s`

MD. (Make Directory) Creates a new subdirectory. If the backslash is omitted before the path, the subdirectory is placed in the current directory.

Use:

`md drive\path\name`

Examples:

`md c:\word\memos`

`md memos`

MEM. (Memory) Displays the amount of memory installed and available for programs. This command is available only with DOS 4.0 and higher.

Use:

`mem`

Switch:

`/PROGRAM` (includes each program's name, location, size, and type)

Example:

`mem /program`

RD. (Remove Directory) Removes a subdirectory. This command can't remove the root directory, the current subdirectory, or any subdirectory with files in it.

Use:

`rd drive\path\name`

Examples:

`rd c:\word\memos`

`rd memos`

David English
Getting Started with DOS

Better Format

Those of you with MS-DOS 5.0 installed should check out the new punch that the new version of FORMAT carries.

The nicest addition to the program, by my way of thinking, is the ease with which you can tell DOS which size disk you're formatting. If you're trying to format a 720K disk in a 1.44MB drive, you can forget the cryptic /T:80 /N:9 string you used to use to pass along information about tracks and sectors on the target disk.

FORMAT now takes a /F switch with which you simply specify the size of the disk you're formatting. FORMAT B: /F:720, for example, is all it takes to format that 720K floppy in a high-density drive.

Another nice feature is that FORMAT uses the MIRROR command to save a copy of the target floppy's file allocation table. This makes unformatting possible if you suddenly realize that you had the wrong disk in the drive when you pressed the Enter key.

Also in the DOS 5.0 version of FORMAT is the quick format—the /Q switch. This option lets you reformat previously formatted media in seconds. Although this is a great timesaver, you should use this method only when working with disks that you know are good. The quick format is quick because all it does is create a new file allocation table and root directory; it doesn't scan for bad sectors.

Tony Roberts
IntroDOS

Conservative System Settings

Tighten up your STACKS, FCBS, and LASTDRIVE. Most machines work fine with a CONFIG.SYS setting of STACKS=0,0. This may actually reduce unrecoverable applications errors under Windows.

Set LASTDRIVE=F or G or whatever your last-used drive letter is, and save about 100 bytes per drive letter. FCBS is a leftover from DOS 1.0. I set my FCBS=1 and save a few bytes.

Mark Minasi

Getting Started with DOS

Compare Files

If you use PC-DOS, use the file compare command. MS-DOS users have had FC, the file compare command, since MS-DOS 2.11. Now it's finally included with PC-DOS. FC is an intelligent file comparison program, one that compares files line by line, detecting deleted and inserted lines. I've used it regularly for years, by moving FC from my copies of MS-DOS to my computers running PC-DOS. It's nice to finally see it included with PC-DOS 5.0.

Mark Minasi

Getting Started with DOS

Back from the Dead

The latest versions of DOS—MS-DOS 5.0 and DR DOS 6.0—include utilities that help you recover accidentally deleted files. It's a relief to have this insurance on hand, but to use this software most efficiently, you have to do a little predelete preparation.

To get the most out of the file-recovery utilities, it helps to know a little about how DOS stores and deletes files. DOS keeps track of each of its files through a directory entry and a table called the File Allocation Table (FAT). The directory entry includes the file's name, size, and starting cluster number. When a file is opened, the system checks the directory for the filename and the starting cluster number. It then uses the data in the FAT to locate the file's subsequent clusters.

Disk files are usually stored in sequential sectors. Other times, particularly on a crowded disk or one on which files are constantly being added and deleted, disk files are scattered around, filling in the nooks and crannies of unused space. The FAT's job is to keep track of the links to all of those scattered sections so that the entire chain can be recalled when the file is opened.

When a file is deleted, the FAT entry that points to it is changed, but the file's data is untouched. The space occupied by the file is made available to the system for reuse. Therefore, it's possible to recover a deleted file by reconstructing its FAT entry and reclaiming the file's disk space. This operation can only be successful, though, if the file is recovered before new information is written to the disk in the areas previously occupied by the deleted file.

So how do the new undelete utilities help? First, both MS-DOS and DR DOS now include the UNDELETE command. At its very basic level, UNDELETE can use a deleted file's directory entry to recover all or part of the file. UNDELETE stands a better chance of making the recovery if the file isn't fragmented or saved in more than one spot on the disk.

The best time to do something about a mistakenly deleted file is immediately after the deletion. Any operation that writes to the disk reduces the chances of your being able to recover a file completely.

UNDELETE is your first level of protection. Even if you take no additional steps to protect yourself, UNDELETE will bail you out of some mistakes.

Both MS-DOS 5.0 and DR DOS 6.0, however, offer additional tools that can make UNDELETE work better and more reliably. MS-DOS has the MIRROR command, and DR DOS has a similar utility called DISKMAP. These utilities take a snapshot of the disk's FAT and set it aside for safekeeping.

When you delete a file, changes are made to the disk's active FAT, but the backup copy of the FAT that was made with MIRROR or DISKMAP is unchanged. If you need the deleted file back, UNDELETE can use MIRROR's or DISKMAP's information to reconstruct the file's chain of clusters and increase the likelihood of a full recovery.

If you use the MIRROR or DISKMAP commands regularly, you give UNDELETE a better chance to succeed. Include the appropriate command in your AUTOEXEC.BAT file, and you'll always have a fairly current backup version of the FAT handy.

Although using MIRROR or DISKMAP along with UNDELETE provides more protection than has been available with any previous version of DOS, DR DOS offers an even more foolproof safeguard against deleted files—DELWATCH.

If DELWATCH is running, the DEL command doesn't actually erase files; it only *marks* them for deletion. The filename is removed from the visible directory listing, but the file continues to exist and continues to occupy allocated disk space.

DELWATCH, which is a memory-resident utility that runs in the back-

ground, keeps track of a specified number of deleted files (200 is the default). Once that limit is reached or the disk becomes full, DELWATCH performs an actual deletion of the oldest file in its pending delete list.

With DELWATCH operating, your chances of recovering a deleted file are almost 100 percent, even if you've saved other data to the disk. The security of DELWATCH comes at a cost, though. First, it occupies memory, and second, the files in the pending delete list still occupy disk space.

As you may have discovered, it's easy to make a mistake and delete the wrong file. If you're using one of the new DOS versions or if you have other undelete utilities, take a few minutes to learn how to recover from a mistake.

Keep in mind, though, that the ability to retrieve accidentally deleted files is no substitute for keeping current backups of your data. Also, because undelete utilities cannot always recover an entire file, they aren't too helpful at recovering deleted program files. You should be able to restore program files from your original disks or their backups.

But even a partial recovery of a data file can be useful. Wouldn't you rather have 18 pages of your 20-page report than nothing at all?

Tony Roberts

IntroDOS

Shutting Off Error Messages

You probably know that you can redirect the output of most DOS utilities to NUL as a way to switch off their output. For example, you might have a batch file that does this:

```
COPY *.* A: > NUL
```

This runs the COPY command, but instead of displaying its message on the standard output device, the screen, it redirects the output to the NUL device, which is a sort of special file that doesn't do anything (nor does it take up disk space). But some commands or error messages those commands issue refuse to cooperate with redirection to NUL. That's because they send their output to the standard *error* device, not the standard *output* device. For example, if you already have a directory called TMP and you enter the command MKDIR TMP on the command line, you will see the error message *Unable to create directory*. This harmless but ominous-looking error message can make naive users uncomfortable. The answer is to use CTTY but to use it within batch files only. CTTY causes all further output (even the standard er-

ror device) and keyboard input to be delivered through the device named on the command line. If you make that device NUL, output will be halted altogether—but so will input. That's why you must use the CTTY NUL command in a batch file; by setting it to NUL, you nullify the possibility of keyboard input. To demonstrate, run this batch file:

```
MD TMP
CTTY NUL
MD TMP
CTTY CON
```

The first line creates the directory TMP. If it already exists, you will see the message *Unable to create directory*. If it doesn't, nothing appears at all. The second time an MD occurs, the error message is issued. But since CTTY has been set to NUL, the message is sent into that great bit bucket in the sky, and you don't see it. CTTY CON sets input and output back to their default state. If you neglect the CTTY CON in your program or try CTTY NUL interactively by entering it at the command line, your machine will lock up (remember that it's not accepting keyboard input), and you'll need to reboot.

Tom Campbell

Tips & Tools

Reet Delete

Sometimes it's nice to have DOS ask whether I'm sure I want to delete all the files in a subdirectory, but most of the time I know what I'm doing, and I'd just as soon not have to answer any questions from the operating system.

Use DOS redirection to solve this problem. Create a file called YES.TXT with a text editor or with COPY CON. In this file put the letter Y followed by a carriage return. Save it as an ASCII file.

Next, enter the following line in a batch file and save it as EMPTY.BAT.

```
ERASE *.* < YES.TXT
```

Now, when you give the command EMPTY, the batch file runs and gets its input from the file YES.TXT. The Y answers the *Are you sure?* prompt for

you. You can put the YES.TXT file anywhere on your system (I keep mine in the BATCH subdirectory) as long as you include its full path when you use it in batch files.

Tony Roberts

Tips & Tools

Faster Keyboard

Speed up your keyboard with MODE. If you have a 286, 386, or 486 computer, MODE can make your keyboard more responsive. Just type MODE CON: RATE=32 DELAY=1. Then the keyboard will autorepeat faster, as well as respond to keystrokes faster.

Mark Minasi

Getting Started with DOS

Unhide System Files

The DOS 5.0 ATTRIB command can now hide and unhide files.

If you try to unhide the system files (MSDOS.SYS, IO.SYS, IBMBIO.COM, or IBMDOS.COM), you'll get a message such as "not resetting attributes for system file XXXXXX.XXX," where XXXXXX.XXX is the file you wanted to unhide.

The reason is simple: ATTRIB will not unhide read-only or system files. The answer is to remove the read-only, system, and hidden attributes all in one fell swoop. To do this, use the following:

```
ATTRIB -R -H -S FILENAME.EXT
```

Then it won't complain.

Mark Minasi

Getting Started with DOS

Deleting All Files in Subdirectory

The following command deletes everything in a subdirectory, but this method lets you see what's going on while the files are being deleted:

```
FOR %%F IN (*.*) DO ERASE %%F
```

This deletes every file in the directory, but it does so by executing the

ERASE command for each file, giving you a chance to double-check the files as they are being eliminated. If you have second thoughts about tossing a certain file, use an UNERASE utility to bring it back.

Tony Roberts
Tips & Tools

Closer Paths

If your path is fairly long and each included directory has a lot of files, you might have a long wait for DOS to find the program. For programs that you run often, there's a way to cut to a small fraction the time it takes DOS to find programs.

Run a text editor and load in your AUTOEXEC.BAT file. Find the PATH statement and notice the order in which the specified directories appear. DOS will search them in that order to find files that you type from the command line. Directories that contain programs that are used often should be first. That way, DOS will find them right away instead of searching most of the other directories first.

How much time can you save? I wrote a COM program that was three bytes long to reduce the loading time. I then disabled my cache program so I could accurately time disk operations. Next, I created a batch file that ran the small program 50 times (making sure ECHO was off so that screen I/O wasn't a factor, either.)

For the first test I placed the small program in my DOS directory, made the DOS directory the first one in my PATH statement, and rebooted. The batch file ran in about four seconds. I then made the DOS directory the very last entry in my PATH statement and rebooted. The elapsed time for the batch file execution was one minute and four seconds. It took 16 times longer than the first test. My computer is a 386DX that runs at 25 MHz. Slower computers compound the delay.

Richard C. Leinecker
Tips & Tools

Check Out Noncontiguous Files

Use CHKDSK to find out which files are noncontiguous. Although CHKDSK has done it since DOS version 2.0, most people don't seem to know that this

DOS utility can scan a subdirectory for noncontiguous files. Just type CHKDSK *.* and you'll see the usual CHKDSK output followed by a listing of the names of the noncontiguous files or the message all files are contiguous.

Mark Minasi

Getting Started with DOS

Load Low

If a program won't load high, try running DOS low. Not every program will load high with the LOADHIGH or DEVICEHIGH statements. You may be tempted to play with the EMM386 memory manager settings to try to fix this—but don't. An easier test is to change your CONFIG.SYS's DOS statement from DOS=HIGH,UMB to DOS=LOW,UMB. Then reboot and see if the problem is cleared up.

Mark Minasi

Getting Started with DOS

Easier Formatting

Using the undocumented /h parameter with the FORMAT command disables the *Insert new diskette for drive* prompt and thereby speeds up the tedious process. Make sure, though, that the right disk is in the drive before you type this command because the format will start immediately.

Vincent A. Lapoint

Tips & Tools

RAM Disk Option

Create a small RAM disk and use SET TEMP to that drive. DOS's redirection and piping facility has always sounded nice, but it wasn't so good when you actually used it, as any pipes were rendered as temporary disk files. The relatively slow speed of disks made pipes and redirection impractical.

Under DOS 5.0, however, DOS can put the temporary pipe files anywhere you specify with the SET TEMP command. Create a RAM drive of, say, 128K, and let's say that the system assigns it a drive letter of E:.

Just use SET TEMP=E:\, and all of your pipe operations will go through a RAM disk running at full memory speed, which makes pipes and redirection much snappier.

Mark Minasi

Getting Started with DOS

Spaces in Directory Names

So programs allow you to create directory names and filenames with spaces in them. How can you access those drives and files?

Although you could not create or access a file or directory with that name using the normal DOS commands, a program that bypasses the command interpreter would have no trouble creating such a directory. The solution is therefore fairly simple. Just get PC Tools and use the PCSHELL program. It provides a desktop from which you can create, rename, access, and delete subdirectories with spaces in their names.

Another option is to use BASIC. In GW-BASIC use the CHDIR or RMDIR commands to work with directory names. BASIC doesn't impose the same restrictions on you as COMMAND.COM.

Another option is to use character 255 in place of the space. Where the space appears in the file or directory name, press down the Alt key and type 255 on the numeric keypad. When you release the Alt key, a space will appear, but the space is different from the one you get if you press the space bar. DOS won't treat this space like a delimiter but as just another character in the filename or directory name.

Feedback

Power DIR

DOS 5.0 is such a treasure trove of goodies that it will probably be years before we find out all of the good stuff that's in it. Take the time to learn DIR's new options. DIR gets the prize for most improved command under DOS 5.0. You can finally see the hidden files in your directory with the DIR /AH command.

I often use DIR /OS, which orders the directory by size. It arranges files from small to large, so I can immediately see the biggest files in the directory. That's useful when I need to free up some space on my hard disk; I can then identify which files will return the most space when erased.

And DIR /AD just shows me the subdirectories, something I previously had to do with DIR *. (and it didn't work for subdirectories with extensions in their names).

Mark Minasi

Getting Started with DOS

Configuring DIR

Go back to the DOS manual and study the options for the DIR command. If you find a set of options that you like, you can set them with an environment variable called DIRCMD. Suppose you always want to see your files sorted by file size; just add this line to your AUTOEXEC.BAT.

```
SET DIRCMD=/OS
```

This command causes DIR to sort by size, unless you tell it to do otherwise.

Mark Minasi

Getting Started with DOS

DIR Sorting Strategies

Use DIR to preview file sizes when copying files to a disk. Many times, I've had to get a subdirectory's worth of data onto floppies. You can't just use COPY *.* if the files won't all fit on a single floppy. So I like to see if I can put just the COM files on one floppy, the EXE files on another, and so on.

I often need to know how many K of COM files I have in a particular subdirectory. With DOS 5.0, that's easy; I just type DIR *.COM. At the end of the listing, DIR tells me the total size of the files. Better yet, I can write a DOSKEY macro to give me just the size.

```
DOSKEY SIZE=DIR $1$2$3$B FIND "file(s)"
```

Then I just type SIZE *.EXE, and it reports the sum of all the EXE files.

Mark Minasi

Getting Started with DOS

Chapter 2

Optimizing Memory

Is it hard to keep straight all the terms and considerations when it comes to managing memory? This chapter is designed to answer all your RAM questions.

In this chapter you'll learn

- All the RAM lingo
- How to increase conventional memory to the max
- What should be in your CONFIG.SYS to make DOS 5.0 the memory manager it was born to be
- How to install third-party memory managers
- What a RAM cache is and what it's good for

How Did Memory Get So Complicated?

All dressed up but nowhere to go. That could describe a PC with too little memory. Without its RAM, your computer can't even load DOS, much less load your program or work with your program's data. Yet despite the importance of computer memory, most of us know very little about it.

How does memory work, which kind of memory should we buy, and what are the best ways to use it? With so many standards—conventional, extended, EMS, LIM, EEMS—and so many kinds of memory—DRAM, SRAM,

DIP, SIP, SIPP, SIMM—you can easily become lost in an alphabet soup of options.

Why are there so many memory standards? At the heart of the matter is a collision of old and new technologies. The DOS we use today is limited by decisions made in 1981 when Microsoft first released DOS—as PC-DOS 1.0.

Because each new version of DOS must be compatible with PC-DOS 1.0, the industry has created a bewildering array of work-arounds to break through the infamous 640K barrier. These techniques allow PCs to access additional RAM, while maintaining the integrity of the original DOS specifications.

At the same time, RAM prices have fallen an incredible 27 percent a year. In 1981, when a 16K upgrade could cost a PC owner \$100 or more, 640K seemed to provide more than enough room for any PC. Now, when you can buy 1024K for less than \$40, it seems ridiculous to be confined to so little memory. Even though DOS created the problem, it can provide solutions of its own.

David English

Getting Started with Memory Management

Five Tips to Get You Started

If you don't know how much memory you have, take a close look at your screen when you turn on your computer. Most computers perform a memory test at startup that reports your total conventional and extended memory.

If you use DOS 4.0 or above, you can run the MEM program to see the amount of used and free memory in your system, including conventional, extended, and expanded memory. When you use the /program switch, MEM also provides a useful report on each program and TSR that's loaded into memory.

With the advent of Windows 3.0, extended memory is usually a better upgrade option than expanded memory if you have a 80286, 80386, or 80486 system.

Even if you have only 640K and a 8088 or 8086 system, you may benefit by setting aside a small amount of memory (24K or 36K) for a RAM-cache program.

Consider using CBoot, DynaBoot, or a similar shareware program that lets you choose from multiple AUTOEXEC.BAT and CONFIG.SYS files on boot-up. With these programs, you can have a different set of TSRs and memory drivers for each application.

David English

Getting Started with Memory Management

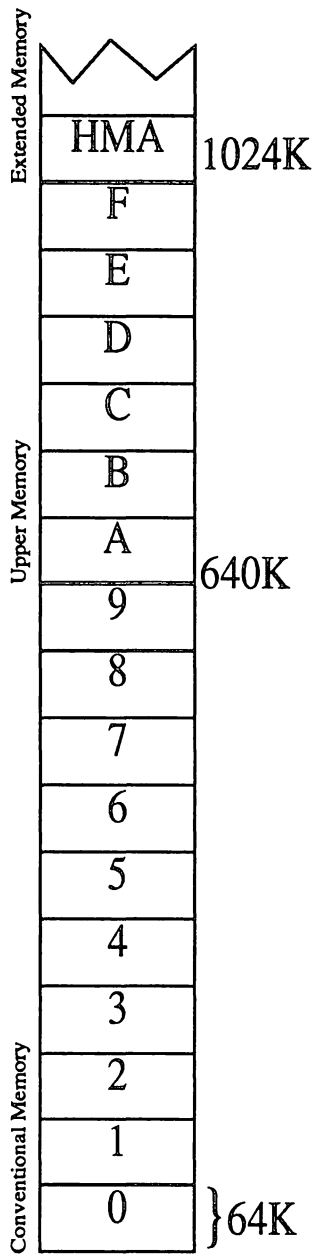


Figure 2-1

Understanding Your PC's Memory

In order to understand memory management, you need to know how memory is used in a PC. Further, you need to acquaint yourself with some of the strange terms used to describe memory—primarily the differences between extended and expanded memory and why one is more useful than the other. Then comes learning the memory management techniques that finally help you get your full hardware dollar value under DOS.

Everything starts with the traditional memory map shown in Figure 2-1.

All PCs, regardless of their microprocessors, have two main areas of memory: conventional memory, which is also called DOS memory, and upper memory, which is sometimes referred to as reserved memory. Together these two areas constitute the basic one megabyte of memory used in all PCs.

Why only one megabyte? Because that was the design of the original PC. Its 8088 microprocessor could only access 1MB of RAM. Further, it could only use that memory in 64K chunks. Therefore, the basic 1MB memory map is divided into 16 banks of 64K each, numbered 0 through 9, then A through F (Figure 2-1).

IBM designed the bottom ten banks of memory—ten times 64K, or 640K—for use by DOS and for running programs. That was ten times the amount available in competing CP/M computers of the early 1980s—a truly massive amount for a personal computer. The rest of the memory, the 384K that makes up the upper memory area, was devoted to future expansion: ROM BIOSs,

	Expanded memory	Extended memory
Extra memory in a PC	Yes	Yes
Memory above 1MB	No	Yes
8088 PC	Yes	No
80286 or later PC	Yes	Yes
DOS programs	Yes	No
OS/2, UNIX, and so on	No	Yes
Data storage	Yes	Yes
Standard	EMS	XMS

Table 2-1

video systems, network adapters, and so on.

This would all work great, and everyone would be happy save for two things: People wanted their PCs to do more, so programs got bigger, and new PC microprocessors appeared that could access more than the 8088's 1MB.

Dan Gookin

Managing Your Memory

Extra Memory in Your PC

For a program to do more, it requires more memory. PC applications grew in size, quickly reaching the "640K brick wall." There is no way around that problem; 640K was and is the max for all DOS programs. Several work-around solutions were developed, such as memory resident programs, also called TSRs (for Terminate and Stay Resident), that allow software to pop up at the press of a key. But the only lasting and practical way to give DOS applications more memory was expanded memory.

The other problem with the 640K limit surfaced with the new, powerful microprocessors hardware manufacturers began tossing into PCs. First the 80286 could access up to 16MB of RAM, 16 times the original PC's limit, and later the 80386 raised the roof to 4096MB, or four gigabytes, of RAM. All that extra memory is referred to as extended memory.

Extended memory sounds like a dream come true: acres of ready RAM. The problem is that DOS cannot use extended memory to run programs; all PCs—regardless of their microprocessors—are stuck with the same 640K limit as the old 8088 when they run DOS. Therein lies the rub: To be compatible with DOS and its volumes of programs, you have to all but ignore your PC's extended memory.

Welcome to the first hurdle to understanding memory management. There are two types of extra memory in a PC, expanded and extended. Of the two, expanded memory is the best solution for DOS programs that need extra memory. Extended memory is useful, but under DOS it's merely a name given to any extra memory (above the 1MB mark) in an 80286 or later PC. Table 2-1 lists the differences, but up front you should remember that for DOS programs, it's expanded memory you want.

Expanded memory is basically an extra hunk of memory in your computer—something like another hard drive, only it's memory. To put this memory into an 8088 or 80286 computer, you need to add an expanded memory adapter card, such as the AST RAMPage! or Intel AboveBoard. For 386 PCs, you create expanded memory by using a device driver to convert your ex-

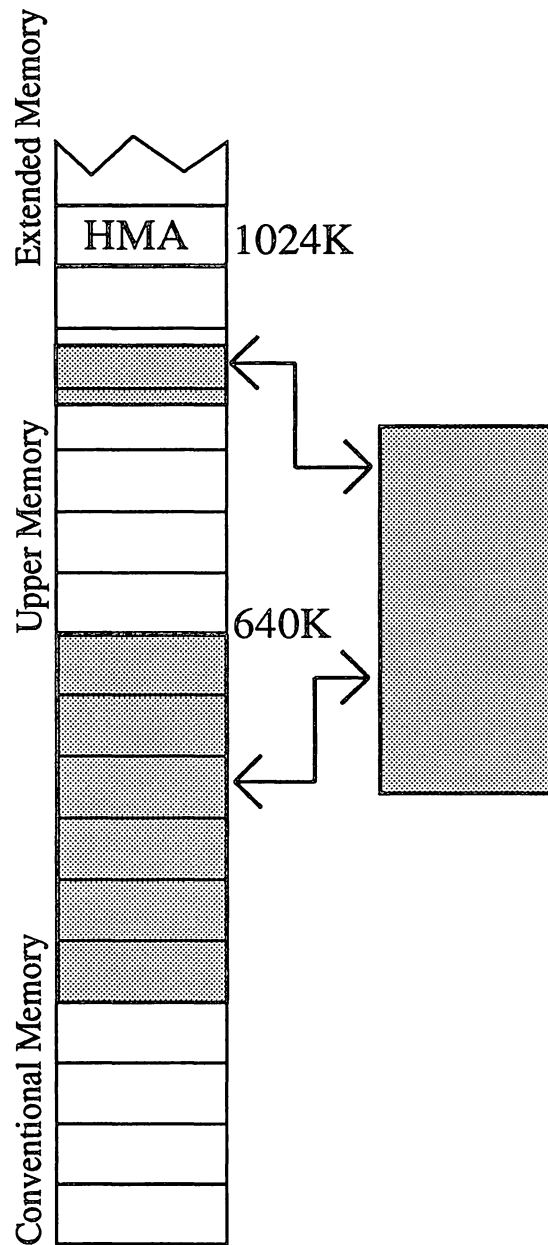


Figure 2-2

tended memory into the more useful expanded memory. (That trick can also be done with some 80286 systems, specifically those with the NEAT or AT/386 CHIPSet from Chips and Technologies.)

On the software side, expanded memory is controlled using the Expanded Memory Specification, or EMS. Since expanded memory was developed by Lotus, Intel, and Microsoft, the standard is referred to as LIM 4.0 EMS. The 4.0 refers to the version, which presently allows for up to 32MB of expanded memory in a PC.

Since expanded memory isn't a part of the PC's basic memory layout, it must be accessed through a special area of memory called the page frame. That's a 64K chunk of upper memory that contains four 16K pages. Each page contains memory that can be copied to expanded memory or that was read from expanded memory (see Figure 2-2).

The page frame and all of expanded memory are controlled by the EMS device driver. That's how your software accesses the extra memory. So when you're working on that massive 1-2-3 spreadsheet, you have no way of knowing that it's really using some 4MB of expanded memory for storage. All the technowizardry is handled by the 1-2-3 software working with the EMS device driver.

The page frame sounds rather inefficient and inelegant. However, your hard drive is accessed only 512 bytes at a time. And working with memory is much quicker than working with a mechanical hard drive, so expanded memory can really be quite zippy. To augment the process, LIM 4.0 EMS also gives you a giant 384K page frame in conventional memory. This allows for major movement of data to and from expanded memory, and it's how task swappers like Software Carousel and DESQview move programs into and out of memory at the touch of a key.

Expanded memory is the true solution for extra memory under DOS and with DOS applications. All PCs can have expanded memory, and most programs that could use a few kilobytes of extra memory will support expanded memory. Fortunately, there are only a few acronyms and silly terms to learn: *EMS*, *LIM*, and *page frame*. But, unfortunately, memory management doesn't end here.

Extended memory is extra memory above the 1MB mark on 80286 or later PCs. Whenever you add memory to those systems, you're adding extended memory. (On an 80286, you add expanded memory via an expansion card.) DOS can't run programs in extended memory. To use extended memory, your PC must run in its protected mode. DOS is an 8088 or real mode operating system. If you have OS/2, UNIX, or Xenix, which are protected mode operating

systems, then extended memory is required. Under DOS, extended memory is a white elephant. However, it can still be used under DOS for data storage, RAM drives, and disk caches. And on 386-level systems, extended memory can be converted into expanded memory. This all starts with an extended memory driver, such as HIMEM.SYS, which comes with DOS 5.0.

HIMEM.SYS controls extended memory via the Extended Memory Specification, or XMS. That's a set of rules for accessing extended memory just as the EMS is a set of rules for working with expanded memory. When HIMEM.SYS or a similar XMS driver is loaded by CONFIG.SYS, it controls all of your PC's extended memory and establishes the XMS standard. This is the first step in 80286 and 386 memory management: Control extended memory.

Part of the XMS specification creates what's known as the HMA, or High Memory Area (see Figure 2-1). This is a bonus 64K bank of memory that DOS can directly use. Thanks to a quirk in the 80286 and later microprocessors, DOS can see the first 64K of extended memory. That bank—the HMA—was originally used by Windows, but under DOS 5.0 it can be shared between DOS and Windows to help save conventional memory.

HMA is the last of the acronyms you need to learn to understand memory on a PC. The others are EMS and XMS. And the different types of memory are conventional, upper, expanded, and extended memory. Between expanded and extended memory, expanded is more useful for DOS. And the bottom line for everything, technical terms aside, is that a system with an 80386-level microprocessor opens more doors for you than any other type of PC.

Dan Gookin

Managing Your Memory

Managing Memory with DOS 5.0

There are three steps to memory management under DOS 5.0: The first is to establish control over extended memory, creating the HMA with HIMEM.SYS and loading DOS into that area. Next comes creating upper memory blocks, or UMBs, and optionally converting over any expanded memory. Finally, there's loading high, which is the process of moving device drivers and memory resident programs (TSRs) into upper memory blocks.

This is important, but it can be confusing. The object of DOS memory management is to free up as much conventional memory as possible, giving your applications more breathing room. Follow along closely, and refer to the

sample CONFIG.SYS file that follows.

REM This is a typical DOS 5 CONFIG.SYS file.

device=c:\dos\himem.sys

dos=high,umb

device=c:\dos\emm386.exe noems

devicehigh=c:\dos\ansi.sys

devicehigh=c:\mouse\mouse.sys

The first memory manager in your DOS 5 CONFIG.SYS file is HIMEM.SYS. HIMEM.SYS controls extended memory, sets up the XMS standard, and creates the HMA. In order to do all that, you need to have an 80286 or later PC with at least 350K of extended memory (any 1MB machine will do).

Given that HIMEM.SYS is in control, your next step is to load DOS into the HMA. This frees up from 40K to 50K of conventional memory, making that much room available to your applications. The command DOS=HIGH in CONFIG.SYS does the job.

If you have an 80286-level system, this is where DOS 5.0 stops. You've freed up some 50K of conventional memory, but that's all DOS 5.0 can do for your machine. If you have an expanded memory card in your system, your next step would be to load your EMS driver (EMM.SYS or something similar), followed by a third-party memory manager, if you have one. Otherwise, the 80286 choo-choo stops here.

On a 386 system, the next step is to create upper memory blocks, or UMBs. These are unused areas of upper memory—that 386K of reserved future expansion memory in all PCs (Figure 2-1). IBM was quite liberal in giving the PC 384K; in most systems, half of that space is empty. To use it under DOS 5, you can install the EMM386.EXE device driver. (Yes, it ends in EXE even though it's a device driver.)

EMM386.EXE will fill in the cracks of upper memory, putting useful RAM into the unused spaces. Those areas of memory then become the upper memory blocks. This is done by installing the EMM386.EXE device driver into your CONFIG.SYS file, along with its NOEMS option. Note that EMM386.EXE must come after HIMEM.SYS is installed.

In addition to installing EMM386.EXE, you also need to tell DOS that there will be UMBs. The command DOS=UMB does that in your CONFIG.SYS file. Since DOS is already equal to HIGH, you can simply stick a comma at the end of the command and then add UMB.

Once the UMBs are created, you can load device drivers and memory

resident programs into them. This frees up conventional memory dramatically; with all your 4K, 10K, and 25K device drivers in the upper memory area, you'll have that much more conventional memory available to your programs.

The command to load device drivers high is **DEVICEHIGH**. It's used in **CONFIG.SYS** exactly like the **DEVICE** command. (See Figure 3, lines 7 and 8.) The **LOADHIGH** command is used at the DOS prompt, or more likely in **AUTOEXEC.BAT**, to load memory resident programs into UMBs. Just put **LOADHIGH** or its abbreviated form, **LH**, in front of any memory resident program you want to load high. Here's an example.

```
LH DOSKEY /INSERT
```

In the example above, the **LOADHIGH** command will put the **DOSKEY** keyboard macro program into a UMB. Note that any options that would normally follow the **TSR** in **AUTOEXEC.BAT** or at the DOS prompt are still specified; the only addition is **LH** or **LOADHIGH** inserted before the program's name.

You can load high all you want. Consider bringing out older **TSRs** and device drivers you didn't think you had the RAM for and using them once again. (Hello, *SideKick!*) DOS will load each of them high until there are no more UMBs. When you run out, DOS will load the program low as it did before. You can use the **MEM** command with the **/C** switch to see which programs are loaded into UMBs and which are loaded low. (Note that **HIMEM.SYS** and **EMM386.EXE** cannot be loaded high.)

Together, all these commands carry out DOS's memory management to the fullest—provided you're a Windows user. Windows wants and needs extended memory to run. If it sees one byte of expanded memory, Windows blanches and won't run in its powerful 386-enhanced mode.

If you don't use Windows or if you'd like some expanded memory for the DOS applications on your 386, then you can use the **EMM386.EXE** device driver to convert some or all extended memory into expanded memory.

```
REM This is another DOS 5 CONFIG.SYS file.
```

```
device=c:\dos\himem.sys
```

```
dos=high,umb
```

```
device=c:\dos\emm386.exe 1024 ram
```

```
devicehigh=c:\dos\ansi.sys
```

```
devicehigh=c:\mouse\mouse.sys
```

This is almost identical to the CONFIG.SYS file shown earlier. The EMM386.EXE device driver line is a bit different, however. First, the value 1024 is specified, and second, the RAM switch is used instead of NOEMS. Otherwise, everything is identical.

The value 1024 after EMM386.EXE indicates that 1MB, or 1024K, of extended memory is to be converted into expanded memory. By default, EMM386.EXE wants to convert 256K of extended memory into expanded. It can convert any value you specify, from 16 on up to 32768 for 16K through 32MB, but usually is limited by the amount of extended memory you have to begin with. Any memory you don't convert remains as extended memory for programs that need it.

The RAM option is basically the same option as NOEMS; both cause EMM386.EXE to create UMBs. The difference is that RAM is used when expanded memory is created. NOEMS directs EMM386.EXE not to create any expanded memory. (Therefore, NOEMS is used only in situations where only extended memory is required, such as when running Windows.)

This wraps up what DOS can do with its memory management abilities. It's not bad considering how much more conventional memory you'll have. But it does require a lot of work on your part, editing CONFIG.SYS and AUTOEXEC.BAT to set everything up and load your programs high. If that bothers you, then you should consider the blessings that third-party memory managers offer.

Dan Gookin

Managing Your Memory

If You Don't Need XMS

If you don't need expanded memory, don't set up EMM386 for it. The DOS 5.0 memory manager does two main things. It creates and fills UMBs, and it creates and manages expanded memory. Expanded or LIM memory is used by some DOS programs—but not most. If you decide to allow EMM386 to create expanded memory with the RAM option, EMM386 will use up 64K of your upper memory space as an EMS page frame. That's 64K that you could be using for TSRs and device drivers, so if you don't need expanded memory, use the NOEMS option with EMM386. You'll also free up some memory for Windows.

Mark Minasi

Getting Started with Memory Management

Third-Party Memory Managers

DOS 5.0 provides a lot of solutions that already existed out in third-party products. Memory management is one of them. While DOS 5.0 now does memory management, and not too badly, third-party memory managers have been around much longer and do things much more neatly—and automatically. If the bottom line excites you, then know that third-party memory managers often give you an extra 20K to 30K of conventional memory over what DOS provides.

Up front, third-party memory management setup is automatic. Your system is analyzed and customized by a series of tests and self-resets. There's no need to toil with editing CONFIG.SYS or AUTOEXEC.BAT ever. When you make changes to the system, you simply rerun the optimization utility that came with the memory manager. Everything is set up for you. It's painless.

If you want to go beyond the basics, the third-party memory managers also give you greater control over your memory. Special options let you customize how memory is used beyond what the automatic installation programs can do. These include options to control shadow memory, include or exclude certain parts of upper memory to work around special expansion cards, or really give you a memory boost by taking advantage of unused video memory.

Stealing video memory is one sure-fire way to break through the 640K barrier. For example, if you have an EGA or VGA graphics adapter, you can surrender its high-resolution graphics memory to DOS, adding an extra 64K or 96K to conventional memory. That ups the ceiling from 640K to 704K or even 736K. Wow! Most programs immediately recognize and greedily gobble up the extra memory—more than they would ever have otherwise. But this trick isn't without cost: Any graphics programs or applications that use a graphic screen (such as WordPerfect's Print Preview) won't work; you'll just get plain CGA color text.

Currently, two powerhouse memory management packages are available for 386 systems: 386MAX (Qualitas, Suite 1386, 7101 Wisconsin Avenue, Bethesda, Maryland 20814; 301-907-6700) and QEMM (Quarterdeck, 1901 Main Street, Santa Monica, California 90405; 213-392-9851). Both offer automatic installation and optimization, extensive options for customizing memory on your system, and 100-percent compatibility with DOS 5.0, Windows, and DESQview.

Dan Gookin

Managing Your Memory

Optimizing with QEMM or 386MAX

Third-party memory managers offer a whole gang of optional switches to customize the way they control your PC's memory. For example, the following command in CONFIG.SYS sets up QEMM.

```
DEVICE=C:\Q\QEMM386.SYS R:2 RAM ST:M
```

QEMM installs both the XMS and EMS drivers for your system's extended memory and also creates upper memory blocks. Therefore, one command in your CONFIG.SYS file serves the same functions as HIMEM.SYS and EMM386.EXE under DOS.

The R:2 option is what loads QEMM into high memory, saving you some 12K; RAM works like EMM386's similar switch to create UMBs; and ST:M turns on QEMM's Stealth option. That compacts and relocates ROM and BIOS areas of upper memory, giving you more UMBs. It doesn't really free up space under DOS, but the memory savings are enormous under DESQview and Windows.

A heavy-duty memory manager competing toe-to-toe with QEMM is 386MAX. The following line sets up 386MAX in CONFIG.SYS.

```
DEVICE=C:\MAX\386MAX.SYS PRO=C:\MAX\386MAX.PRO
```

The file 386MAX.PRO is the memory manager's profile; it contains a list of command line options for 386MAX that keep your CONFIG.SYS file from getting junky.

Both QEMM and 386MAX have video memory-stealing options. For QEMM the option is VIDRAMEGA. That preserves EGA and VGA memory. Then you use the memory resident VIDRAM utility to turn that extra memory on or off; 386MAX uses the option CGA to hand over an extra 96K of EGA or VGA memory to DOS. Either way, you up the limit of DOS from 640K to 736K.

Dan Gookin

Managing Your Memory

Working with an 80286

The DOS 5.0 memory management solution—like all memory management solutions—works best with 386 systems. If you have an 8088 or 80286 system, however, all hope is not lost. There are solutions, but only with the aid of third-party hardware and software.

Your first step is to install a LIM 4.0 hardware-compatible EMS expansion card. Pack it full of RAM, maybe 2MB worth. Next, you'll need to purchase a third-party memory manager. My recommendation is QRAM from Quarter-deck. Under DOS 5, you can then set up your CONFIG.SYS file as follows.

```
DEVICE=C:\DOS\HIMEM.SYS
DEVICE=C:\EMM.SYS AT 258
DEVICE=C:\Q\QRAM.SYS R:1
DOS=HIGH,UMB
```

HIMEM.SYS is loaded first, followed by the expanded memory manager for your EMS expansion card. Next, QRAM is loaded to control expanded memory. Finally, you can load DOS high and create UMBs with the DOS configuration command. From that point forward, the DOS commands DEVICEHIGH and LOADHIGH will work on your system just as they would on a 386. The overall conventional memory savings won't be as great, but this is the best that can be done with an 80286.

Dan Gookin

Managing Your Memory

RAM Caches Explained

The RAM cache is an extremely useful feature in today's 386- and 486-based PCs that, unfortunately, is frequently misunderstood.

A cache is a section of memory separate from the main system memory. It works by intercepting repetitive tasks and data and holding them for immediate access when needed. As your computer processes information, going to the cache is much faster than going to the disk. So in addition to reducing the amount of hard drive access required to fetch this data, the cache greatly increases a system's overall information-processing speed.

Many vendors offer external caches on their higher-end 386 models, and cache sizes typically range from 32K up to 256K. Separate memory chips (usually DRAMs) are required for populating the cache sockets, and the cost per kilobyte of RAM with these can be rather expensive compared to the cost of SIMMs (Single In-Line Memory modules).

The 486 systems have a giant head start over 386 systems, since there's a built-in 8K RAM cache integrated right into the i486 CPU itself and almost every 486 system provides sockets for additional external caching as well. While the 8K cache doesn't sound tremendous, in reality the i486's built-in 8K cache

has the same power and capacity as a 32K external cache. The reason is that Intel's i486 chip uses four-way set-associative architecture.

Here's how the chip architecture works. Typical 32K external caches are usually two-way set-associative, which means that they do comparative data associations (comparing the data stored in RAM with that currently being requested by the user or program at that instant) using bidirectional processes, as opposed to the i486's quad-process method. In practical terms this means that the i486 can find and use RAM-cached data faster and more efficiently—on a consistent basis—than external caches, which are often hit-or-miss.

The cache size you need depends on such factors as how much money you can spend on the system and additional DRAM chips to expand the cache, what types of applications you normally use, and how much of your computing involves accessing the same information over and over. Generally, 32K is a practical size for most users, since the vast majority (about 90 percent) of the data in use at any given time will remain in the cache until summoned by the user or program.

Performance increases over a 32K cache with larger caches (64K, 128K, or 256K) are generally imperceptible except when you're using the most demanding applications. Even then, you'll have to carefully consider whether the slight performance gains offered by larger caches will offset the extra expense involved in purchasing additional RAM chips.

Tom Benford
Test Lab

Conserving Memory

Add the line `DOS=HIGH` to your `CONFIG.SYS` file, and DOS 5.0 will load into the first 64K of extended memory, freeing conventional memory for applications.

If you have a 386 or better, you can add the `UMB` command (`DOS=HIGH,UMB`) so that programs such as device drivers and TSRs can run in upper memory as well. First you need to install the `EMM386.EXE` memory manager, and you need to direct your drivers and TSRs to high memory by using the `DEVICEHIGH` command in `CONFIG.SYS` and `LOADHIGH` in `AUTOEXEC.BAT`.

Tony Roberts
Tips & Tools

Chapter 3

Hard Disk Management

Probably the single most valuable peripheral on your computer, after the keyboard and the monitor, is the hard disk. In the early days they were small, slow, and prone to failure and accident. Since those days, the hard disk has grown larger in capacity, smaller in size, faster, and less prone to misfortune, but you'll still find yourself sweating over it. Here are some tips to make your hard disk more useful and less troublesome.

In this chapter you'll learn about

- Working with large hard disks
- Selecting the right utility to use for hard disk maintenance
- What undelete and unformat utilities do
- Locating files that need backing up
- Eliminating files selectively

Organizing Large Drives

Having a big, fat hard drive is wonderful, but managing large amounts of storage presents a new set of challenges.

For example, how should you set up your hard disk—one huge partition

or two or more smaller ones? Let's look at the advantages and drawbacks of each setup.

The main advantage of assigning the entire disk to one large partition is convenience. Navigation is a little easier with everything in one place, but you run some risks.

Keeping huge amounts of data in one partition is like carrying all your eggs in one basket. If the FAT (File Allocation Table) for that partition gets scrambled, your entire data set could end up fried.

By breaking up your disk into partitions, each with its own FAT, you have some protection. If one FAT becomes damaged, your loss will be limited to the information in that partition.

Tony Roberts
IntroDOS

Clusters

When you're working with a very large hard disk, you have to consider cluster size and wasted space. A cluster is the smallest unit of assignable disk space, and an unnecessarily large cluster size wastes some of that precious space.

To check the cluster size of your disk, run CHKDSK. Near the bottom of the CHKDSK display, you'll see a line saying "X bytes in each allocation unit." This tells you the cluster size. Every file is allocated disk space in clusters.

If your disk is a floppy disk, that cluster will likely be 1024 bytes. A 1-byte file would be allocated one cluster and occupy 1024 bytes of disk space.

Hard disks ranging in size from about 18MB to 120MB have cluster sizes of 2048K. Larger hard disks assign space in units of 4096K. So a 1-byte file on a 100MB hard disk would occupy 2048 bytes, and the same file on a 200MB hard disk would occupy 4096 bytes.

Let's say you have a hard disk with a 4096-byte cluster. Assume the disk holds 2500 files. The data in each file fills some clusters and partially fills one—the last—cluster. Some of these last clusters will be nearly empty, some will be nearly full, and most will be somewhere in between. For the sake of discussion, let's say the last cluster of each file averages one-half cluster (2048 bytes) of unfilled space.

Multiply the average unfilled space (2048 bytes) by the number of files (2500). You get 5,120,000 bytes of space that your files occupy but don't actually use.

If you break your hard disk into smaller partitions which use 2048-byte clusters, you can recover half of that unfilled space. Assuming that the average

last cluster is still half-full, you've reduced your occupied but unused space to 2,560,000 bytes.

If you keep thousands of files on your hard disk, a smaller cluster size can pay off by giving you extra room to work. On the other hand, if your disk is used to store only a few multimegabyte database files, larger partitions may be a better choice. Your database will have room to grow, and you won't be concerned about running out of real estate for your data.

Tony Roberts
IntroDOS

Faster Backups

Breaking up a disk into partitions helps at backup time. Imagine backing up a 200MB disk onto floppies. You can see that you'll want to be selective about what you back up. Some data you'll want to back up daily, some occasionally, some never.

I have all of my work files on one partition, and I back up my changed files on that partition daily. I use a second partition for files I never want to back up. I use this for test files or shareware programs that I'm trying out. If I like the product and intend to use it and register it, I move it to my main partition. If not, I just delete it.

My third partition is used for telecommunications activity— files to upload or download as well as incoming and outgoing messages. I back up this partition occasionally to make sure I can restore all of my programs, scripts, and configuration files, but I'm not too concerned about the data on this partition. If the file is important, it either gets printed out or moved to my primary partition.

Because I've arranged my disk this way, my daily backups are much faster and less intrusive than they would be if I had to deal with the entire hard disk.

Whether you have one huge partition or many smaller ones, you still have the same amount of data, and you must take pains to protect it. The larger your hard disk, the larger your loss if something goes wrong.

Tony Roberts
IntroDOS

Be Sure to Run Chkdsk

Run CHKDSK on each of your hard disk partitions daily. You can put the commands to do this in your AUTOEXEC.BAT file, and you'll learn early if any-

thing is out of whack on your drive. At the first hint of a problem, take quick corrective action.

If you have a more powerful disk-fix utility, use it rather than CHKDSK to make sure your storage areas are sound. Such utilities are more comprehensive and easier to use than CHKDSK.

Tony Roberts

IntroDOS

The Norton Utilities and PC Tools in File Management

Currently, there are two contenders for the PC-utility crown: The Norton Utilities, still going strong after ten years, and PC Tools, Central Point Software's powerhouse utility package.

Overall, Norton and PC Tools stack up fairly well, with PC Tools taking a giant lead only in the productivity area. Specifically, each program has both command line and integrated environments, allowing you to operate the utilities from a batch file or from within a cozy, colorful graphic environment you can manipulate with a mouse. Both programs have online help, and both come with a handy recovery disk you can use right away if perilous conditions prevailed before you bought the utility.

Norton misses several Windows-specific programs that come bundled with PC Tools. Yet, PC Tools eats up 9.5 megabytes of disk space—almost four times what Norton uses.

File management is the ability to control and manipulate files beyond the simple commands DOS offers. There are two ways to approach this. The first is in an integrated environment where files are displayed along with commands that can control them. The second is the traditional way DOS lets you work with files, via the command line.

Both DOS and PC Tools come with shell programs that assist in file manipulation. Both shells let you copy, rename, delete, and move files singularly or in groups. The shells also come with their own customizable menus, allowing you to install your own programs into the shell and use it as your base of operations for the entire time you're in DOS. In addition to file manipulation, PC Tools' PC Shell also acts as control center for the other utilities in the PC Tools arsenal.

Norton lacks a file-management shell. It does, however, sport an integrated environment. From the environment you can select utilities, read about their options, and customize a command line that the environment can execute

for you. This isn't the same thing, however, as a file-management shell.

In the area of file tools, The Norton Utilities lives up to its ten-year reputation. There are programs to change the date and time of files, size up files for copying to a floppy disk, and locate and modify files anywhere on disk.

One major disappointment with both utilities is the lack of a move command, an alternative to copying and deleting files. DOS and PC Tools offer this in their shells but not as a command line utility. Norton skips over a move command completely, which I find disappointing. Mace Utilities, which isn't covered in this comparison, has an excellent move command.

Dan Gookin

Norton Utilities and PC Tools

The Norton Utilities and PC Tools in Security

This is a new category of PC disk utility, something nearly as important as the data-recovery programs. Security utilities offer protection from disaster before it strikes.

The main type of security program is similar to DOS's MIRROR; it makes an image of the boot sector, FATs, and root directory and saves it elsewhere on disk. This aids in recovery from accidental reformats and allows those vital parts of the disk to be rebuilt if something goes wrong. Norton's program is named Image; PC Tools' is called Mirror. Microsoft licenses the DOS command MIRROR from Central Point Software.

Another form of security is file encryption. Both Norton and PC Tools offer a way of taking the data in one or more files and secretly encoding it. The only way to decode the file is by using a password or code key. PC Tools takes this concept one step further and allows you to create encryption directories; all files placed in those directories are automatically encrypted, and access to the directories is only possible by password.

In the era of the computer virus, antivirus utilities are popular. Both Symantec and Central Point Software distribute their own antivirus programs. However, only PC Tools comes with a virus-scanning utility, Vdefend. While it will locate some viruses, it does little in the way of removing them (other than recommending you buy Central Point's other virus-specific software).

More important than direct virus detection, both utilities offer special disk-locking utilities that prevent unauthorized access to sensitive areas of the disk. Norton's Disk Monitor and PC Tools' Data Monitor allow you to lock out all or some sectors of a hard drive, preventing access or just monitoring sensitive areas of the disk that shouldn't be touched. For most users, this type of

protection from viruses (and other nasty programs) will be enough.

Dr. Disaster PC utilities were given birth by Peter Norton's Unerase program. Both utility packages—and now DOS—offer undelete and unformat commands. PC Tools has Undel, and Norton still retains Unerase after all these years. And thanks to the disk-imaging programs (Mirror and Image), recovery of a disk's boot sector, FAT, and root directory is also possible.

Both Norton and PC Tools also have unformatting utilities, which is no longer a big thing, since the UNFORMAT command is now a part of DOS's data-recovery repertoire. This is all traditional stuff—no new bugs under big rocks here. What is unique to both The Norton Utilities and PC Tools is their new array of file-recovery, delete-prevention, disaster-prevention utilities. This is a special type of program that stores the files DOS deletes in special directories. Recovery is then 100-percent guaranteed by simply plucking the deleted file out of the special directory. The Norton Utilities uses the Erase Protect program to pull that trick; PC Tools has Disk Monitor.

Individual files can always go south, as anyone who's worked with too large a spreadsheet or database discovers. Both PC Tools and Norton offer programs to repair errant data files for 1-2-3, dBASE, and other popular formats. Both programs are called File Fix, and both will attempt to patch up the same types of files.

When bytes start fleeing from a troublesome disk, you can use PC Tools' DiskFix program to diagnose and repair the problem. The Norton Utilities uses The Norton Disk Doctor for diagnosis, as well as a wonderfully crafted (though technical) Troubleshooting Guide plus the Disk Tools utilities to eventually remedy the problem.

Dan Gookin

Norton Utilities and PC Tools

The Norton Utilities and PC Tools in Five All-Purpose Hard Disk Tools

In each package, you'll find several interesting, integrated utilities whose purposes seem to overlap. This appears to be the approach for disk utilities of the future: one piece of software that deals with several related areas of data protection, diagnosis, and recovery. Between PC Tools and The Norton Utilities, five individual programs handle those duties: DiskFix, Data Monitor, Disk Monitor, Disk Doctor, and Disk Tools.

For example, PC Tools' DiskFix handles repair and disk-tuning options, while the Data Monitor program covers delete prevention, password-locking

and encrypting of files in a directory, write-protecting sensitive parts of a disk, and other assorted duties.

The Norton Utilities' Disk Monitor will restrict access to sensitive areas of the disk, park your disk drive heads, and monitor other types of disk access. Disk Doctor is used to diagnose disk problems, and then Disk Tools will repair them, as well as perform other interesting duties.

I find this division of duties confusing—and not just from looking at five different programs that handle several dozen overlapping functions. A single integrated program for either PC Tools or The Norton Utilities would make more sense. Either that, or split up the duties into several dozen individual utilities. Given the bulk of PC Tools and The Norton Utilities, it would be easy to miss the valuable features offered in these handy little programs, so a new approach is bound to benefit all users.

Dan Gookin

Norton Utilities and PC Tools

The Norton Utilities and PC Tools in Productivity

Productivity utilities are almost totally the domain of PC Tools. Its PC Desktop program could stand by itself, right next to Borland's SideKick. Yet Central Point Software has graciously included it with the PC Tools package.

PC Desktop features an appointment calendar, an autodialer, calculators, a database, notepads, and an outliner. A clipboard allows global cutting and pasting, and a general macro facility helps you customize PC Desktop.

Beyond the basic features of PC Desktop, you'll find extensive communications programs in various areas of the PC Tools program:

DeskConnect is a desktop-laptop communications program that is able to access files on one computer from another and exchange files between two computers (the second computer doesn't need to be a laptop).

Commute is a PC remote-control program, allowing you to access and use a computer at another location via modem. What you see on your screen is exactly what appears on the remote PC's screen. You can have password protection and host callback, and even monitor remote log-ins.

Modem communications and electronic mail are both features of the PC Desktop telecommunications module. Modem communications allows you to dial up any other PC connected to a modem. The electronic-mail module provides an easy link to MCI Mail, CompuServe, and EasyLink online services. You must have a compatible modem to make this possible.

PC Desktop is also capable of handling fax communications. To do this, your system must have a compatible internal fax card.

With The Norton Utilities, productivity enhancement is provided in two areas: the Batch Enhancer, which adds more power to your batch files, and The Norton Control Center, where you can monitor and adjust various hardware settings and control your DOS environment. PC Tools lacks both of these features.

On the other hand, both packages have a system information utility. It displays a profile of your PC's hardware contents, plus it does benchmark testing and a wee bit of diagnosis. It's mostly for show.

Dan Gookin

Norton Utilities and PC Tools

The Norton Utilities and PC Tools: Which Utility Do You Need?

I find it hard to argue against having PC Tools. It's actually four programs in one: a general package of utilities, a file manager, a backup program, plus the PC Desktop program with its productivity features.

On the downside, the program is overwhelming. I doubt if any one user will ever master the complete package, and books on PC Tools are fat and intimidating. You could make it a lifelong endeavor to say you've used everything in the package (which has often been the case with other major applications as well).

Comparatively speaking, you'd need to buy The Norton Utilities plus The Norton Backup and The Norton Commander even to start comparing the packages across the board. (This stems from Symantec's view of PC Tools as an end-user product and its outdated and stubborn insistence that end users don't buy programs.) For basic utility needs, however, Norton more than fills the bill. If you don't want the bulk of PC Tools and don't need CP Backup or the productivity utilities of PC Desktop, then The Norton Utilities is a slimmer choice.

Another basis for your decision is whether or not you feel comfortable working inside a file-management shell. If so, then PC Tools will probably be your choice. If you prefer the DOS command line, then Norton is for you—especially given the inclusion of NDOS to replace COMMAND.COM. There's also a third option: As the scarecrow says to Dorothy in *The Wizard of Oz*, "Some people do go both ways." Personally, I use Norton on my desktop machine and PC Tools on my laptop.

Whichever utility you choose, PC utilities have grown in power and ability over the last ten years. And the bottom line is that there are plenty of options for any PC user looking to enhance DOS with some utility power.

Dan Gookin

Norton Utilities and PC Tools

DOS 5.0's Utilities

What makes DOS 5.0 such a remarkable upgrade is its arsenal of new features, including MIRROR, UNDELETE, and UNFORMAT—utilities formerly available only from third parties that are now commands under DOS. With those three programs, DOS can now be both the hero and the villain.

Along with its disaster-prevention and data-recovery utilities, DOS also sports other new commands that were formerly the exclusive domain of third-party utilities.

Since day one, DOS help utilities have been available, giving users online access to the DOS manual, command syntax, and options. Now that's all a part of DOS with the HELP command plus the optional / ? switch on all other major DOS commands.

The DOS Shell program gives all DOS users a comfortable, graphic, mouseable environment in which to manipulate files and directories, work with disks, run programs from a menu, and switch between several programs stored (but not running) in memory at once. This pits DOS head-to-head with such program swappers as Software Carousel and DESQview, as well as file/shell programs like XTree and PC Tools' Shell.

The HIMEM.SYS and EMM386.SYS configuration commands—plus DEVICEHIGH and LOADHIGH—are all now a part of DOS's memory-management skills. While not as advanced as some third-party packages, DOS's memory-management drivers and commands will give 386 owners more RAM in which to run DOS programs plus control for both extended and expanded memory.

Though DOS has always come with RAM-drive software, only with version 5.0 did Microsoft start tossing in a disk cache. The SMARTDRV.SYS software gives DOS users greater ability to speed up disk operations than the old FASTOPEN command.

Extensive command line editing, history, and macros are now possible, thanks to DOSKEY.

DOS 5.0 also upgraded the version of BASIC shipped with DOS. GW-BASIC is now just a REM in the history books and has been replaced by QBASIC,

an interpreted version of Microsoft's QuickBASIC compiler.

Along with QBASIC comes DOS's new EDIT program. EDIT is much better than the old EDLIN, yet interestingly, it's an element of the QBASIC program. Third-party editors are more diverse and also more compact, since running EDIT requires the 250K QBASIC.EXE program.

If DOS continues to grow at this level, future versions may contain even more diverse utilities. On the must-have list are a defragmentation utility, better backup and restore, password protection and file security, and a disk doubler or file-compacting program. With those features—and possibly more—DOS may soon become a complete operating environment.

Dan Gookin

Norton Utilities and PC Tools

The Down-and-Dirty on Undeleting

Just exactly what kind of mojo is involved with undeleting a file? What Frankensteinlike science is required to bring a dead file back to life? The secret to undeleting a file lies in DOS's laziness.

DOS deletes a file like you would remove someone's name from your address book: The person is still alive and probably lives at the same address, but your record of them is gone. DOS deletes files in a similar manner: It goes to the disk directory and replaces the first character of the filename with an I-am-deleted byte. Further, it marks the file's location on disk as available in the disk's map (or FAT). Again, only one byte is changed.

The reason why DOS deletes files this way is speed. Changing two bytes is quicker than going out to the disk and rubbing the file out. Yet the side effect of this method is that the file's contents on disk are still intact. A recovery utility needs only to change the I-am-deleted byte in the directory back to the first letter of the file's name and then change the I-am-available byte in the FAT to an I-am-occupied byte. Once that happens, the file is restored.

While the above discussion makes undeleting a file sound easy, the technomagic required is more complex. A lot of things can mess up file recovery. The most deadly event is when some other file overwrites all or part of the deleted file's data on disk. Smart recovery programs can detect this and will refuse to restore the file. However, as long as you undelete files before any other files are written to disk, you can safely recover anything.

Dan Gookin

Norton Utilities and PC Tools

Unformatting a Disk

While undeleting files met with miraculous acclaim back in 1983, unformatting a disk met with stunned disbelief only a few years later. Like recovering a deleted file, restoring a freshly formatted disk seemed unbelievable. Yet with DOS's lazy FORMAT command accidentally erasing hard drives right and left, an unformat utility was sorely needed and a great success.

Unformatting a disk is possible because, as with deleting a file, DOS is rather lazy. Basically, when DOS sees a disk is already formatted, it only erases its first track and creates a new boot sector, root directory, and two disk maps (or FATs). The remainder of the disk—with its data still intact—is only verified. DOS 5.0's QuickFormat option even skips the verification stage.

An unformatting program looks for the earmarks of subdirectories on a reformatted disk. It then attempts to rebuild the root directory and FAT as it locates the files in those subdirectories. As long as the bulk of the reformatted disk's data was in subdirectories, full recovery is possible. However, any files in the root directory are generally lost.

To augment recovery, many unformatting utilities come with a disk-imaging program, such as DOS 5.0's MIRROR, PC Tools' Mirror, and Norton's Image. Those programs copy the boot sector, root directory, and FATs and place them in special image files near the end of the disk. Then, if you need to unformat a disk, the unformat utility will check for the image file hidden on the disk. If it's found, recovery is nearly instantaneous and complete.

Dan Gookin

Norton Utilities and PC Tools

Hard Disk Size Crisis

By now, most everyone knows the worst part of PC- and MS-DOS 3.3—they're limited in that they can only address a drive up to 32MB. You may know that DOS 4.x and 5.x can theoretically address a drive of up to two terabytes (two trillion bytes), but you probably don't know that you're essentially restricted to 516MB because of your BIOS. Here, I'll lead you through the maze of disk size limitations—limitations we'll all have to learn to live with.

First, understand that limitations of various kinds are imposed by the layers that data must pass through from the disk to the applications program. It looks something like this: disk -> disk interface -> BIOS -> DOS.

The first hurdle is the interface. The most common interface is the ST506 interface, so let's start from there. Disk geometry is dependent on how the data is laid out on the disk. There are multiple read/write heads on a disk, as hard

disks consist of multiple metal platters on which the data resides. Each disk surface is divided into circular concentric areas called tracks, which are like the lanes of a racing track, and each track is divided into a number of sectors. Each sector contains 512 bytes of data, or, expressed differently, 0.5K of data. An ancient 10MB XT hard disk had four heads, 305 tracks per head, 17 sectors per track, and 0.5K of data per sector for a total of $4 \times 305 \times 17 \times 0.5K$, or 10,370K bytes of data capacity.

Mark Minasi
Hardware Clinic

The Beast with 16 Heads

The common ST506 interface can only support up to 16 heads (8, actually, but most AT-type ST506 controllers break the rules and go to 16), and it really doesn't care how many sectors or cylinders the disk has. So ST506 imposes the first constraint—the disk can have no more than 16 heads. The newer ESDI interface, by comparison, can support up to 256 heads, up to 4096 cylinders, and up to 256 sectors per track (256 heads \times 4096 cylinders \times 256 sectors per track \times 0.5K bytes per sector would be about 135 gigabytes). The other newer SCSI and IDE interfaces don't care about heads and cylinders, as they're designed differently, and are only concerned with the total number of sectors on the disk.

Next is the BIOS. The BIOS disk interface is called INT 13 after the programming command used to access it. It was originally defined for floppy disks, and therein lies the source of many of its problems. An 8-bit register, called CL, stored the sector number. Another named CH stored the track number. And a third 8-bit register called DH stored the head number. Eight bits can represent up to 256 values, so that meant that the BIOS supported up to 256 heads, 256 cylinders, and 256 sectors per track.

For the sake of convenience and compatibility, INT 13 was augmented to support hard disks in the XT and later machines. 256 cylinders \times 256 heads per cylinder \times 256 sectors per track \times 0.5K bytes per sector isn't a bad limit—8.4GB. But it's arranged wrong. Nobody makes a drive with more than 16 heads, and virtually all hard disks have more than 256 cylinders.

So INT 13 for the hard disk cheated a bit.

The definition of CH and CL was blurred a bit. CL still stores the sector number, but only in the low six bits of CL. The high two bits of CL were tacked onto the front of CH for the cylinder number. That means that CL—the sector number—can only assume a value up to 63. CH—the cylinder number—can

only assume a value up to 1023, the largest value that can be represented with ten bits.

So the BIOS imposes a restriction of cylinders no greater than 1023, sectors per track no greater than 63, and heads no greater than 256. As you'd imagine, 256 heads isn't a problem. The 1024 cylinder barrier is a major pain, as many of today's drives exceed it, and the 63 sector barrier is being approached by many drives. What should you do if you have a drive with more than 1024 cylinders? You can sidestep the BIOS, as with SpeedStor or OnTrack, but you sacrifice compatibility with Windows and will be unable to use OS/2.

How do some drive makers get around this? They tell their drives to lie to the PC. Rather than saying that they have four heads and 2000 cylinders, they say they have eight heads and 1000 cylinders. The result comes out the same, capacitywise. Doing this is called translation—sector, head, or cylinder translation. Basically, translation is undesirable because it removes much of your flexibility in doing data recovery when problems arise. I avoid it.

Last in the limitations list, DOS has size limitations. The major DOS limitation is imposed by the boot record. There were, prior to DOS 3.31, two bytes—16 bits—set aside for the total number of sectors per logical drive. The size of 16 bits implies a maximum number of sectors equal to 65,536, or 64K. As each sector is 0.5K in size, the total size of the logical disk was restrained to 64K X 0.5K bytes per sector, or 32MB per logical disk.

DOS 3.31 and later versions have removed this restriction, however, setting aside four bytes for the total number of sectors. Four bytes is 32 bits, describing two terabytes of disk size—enough to hold us for a while.

So how large a disk could you buy today without resorting to translation? Assuming that the large drive was an ESDI, your limitations would be as follows:

cylinders = 1023 (BIOS limitation)

heads = 16 (market limitation—no drives today have 17+ heads)

sectors per track = 63 (BIOS limitation)

bytes per sector = 0.5K (only because most software expects it)

total (1023 X 16 X 63 X 0.5K) = 516MB

Of course, this isn't the limit. As I've said, if you don't mind giving up OS/2 and UNIX compatibility, device drivers that ship with OnTrack and SpeedStor can double the size of the cylinders to 2048, allowing drives up to 1032MB, or just over a gigabyte, under DOS.

Should you care, given how complicated this all appears? Yes, and the

reason is that DOS is reaching a crisis. While 516MB may seem like a lot, it's not. You can now buy a 200MB drive for just \$500. Drives exist that store over one gigabyte and cost in the \$3,000 range, not much more than you would've paid for a 60MB drive just a few years ago. In the mid nineties, you'll be able to buy a 500MB drive for just \$700. Something's got to be done: either a general acceptance of device drivers to access hard disks or a new augmented BIOS standard. You can be sure that there will be more than one solution offered and several proposed new standards hawked by the big vendors.

Is there another answer? Sure. Two, in fact. But you won't necessarily like them. I recently installed a 631MB drive in a new system, an ESDI drive. As the drive's being put in a system with an EISA bus, I thought I'd try out a bus-mastering controller to see if bus-mastering controllers are all they're cracked up to be.

With ESDI, the drive tells the controller all its vital statistics. Rather than your having to run a setup program to tell the controller that you've got so many heads, cylinders, and the like, you just plug the drive into the controller, and away you go. When it's format time, the controller just asks the drive how it's laid out and formats accordingly.

You can imagine my surprise when I ran a disk-tester program on my new 631MB drive and it reported that it had 64 heads, 32 sectors per track, and 631 cylinders. After a moment's thought, I realized that my bus-mastering controller was evading the "How do I deal with more than 1023 cylinders?" problem by doing sector translation. Notice how the controller does it—64 heads, 32 sectors per track. (The actual geometry is 1630 cylinders, 15 heads, and 52 sectors per track.) A little arithmetic shows us that 64 heads X 32 sectors per track X 0.5K bytes per track yields a cylinder that's exactly 1024K—one megabyte—in size. This is actually a fairly popular translation scheme, perhaps because IBM uses it in many of its desktop PS/2s, most of which do some kind of translation. If it has any virtue, it's the existence of cylinders that are exactly one megabyte in size that makes partitioning easy under DOS 3.3's FDISK. When FDISK under 3.3 allows you to chop up a drive, it forces you to do it in units of cylinders, units that most of us don't have close to hand. By making each cylinder one megabyte in size, the translating controller lets you specify a number of cylinders equal to your desired partition size in megabytes.

So I've got the drive installed. It's incredibly fast, and DOS likes it just fine—but, as I said above, I'm stuck in DOS with this controller and hard disk. As it's a sector translator, it confuses OS/2 and UNIX. That's not the end of the world, however, as the controller manufacturer, Ultrastor, includes drivers for OS/2 and UNIX. The OS/2 drivers work just fine with OS/2 version 1.3, but

I'm still just a teensy bit uncomfortable about the future. Will Ultrastor support OS/2 version 2.0? Will the company be around when OS/2 version 47 arrives? We'll see.

I bought that drive because I've worked with one like it before. It's the Maxtor 676E, and it's an excellent device. I've installed it on another machine, gotten the full capacity available to DOS, and still not sacrificed OS/2 compatibility.

First, I got a fairly vanilla ESDI controller, the Western Digital WD1007W. It sees the drive as a 1630-cylinder drive—which is good. I avoid problems with DOS by just not telling DOS that there are any cylinders after 1023. So from the point of view of DOS, UNIX, OS/2, and the bunch, it's a drive with 15 heads, 1023 cylinders, and 52 sectors—a 390MB drive. That's all the drive that OS/2 and UNIX see. But I can recover the remaining 241MB by using Disk Manager. Now I have 390MB available to any system and an extra 241MB just for DOS. Not a perfect answer, but one that doesn't involve translation.

Mark Minasi

Hardware Clinic

Backing Up Is Hard to Do

Put this batch file, NDBACKUP.BAT, in a directory specified in your PATH statement. It displays the files located in the current subdirectory that aren't backed up. It's a simple two-liner:

```
@ECHO OFF
```

```
ATTRIB *.* %1 | FIND "A" | MORE
```

It lists the names of the files and their attributes. The ATTRIB command reports on files that are not backed up by putting an A (Archive) next to their filenames. It also reports files that are read-only by putting an R next to their names. The ATTRIB command looks at the file attributes, and the FIND filter shows only those files with the A attribute. I added the MORE pipe so the filenames wouldn't scroll off the screen. To run the batch file, enter NDBACKUP /S at the DOS prompt. Make sure that FIND.COM and MORE.COM are available to the system when you run the batch file. (They should be in a subdirectory listed in the PATH or on the same disk as the batch file.)

The /S switch reports on not only the current subdirectory but any subdirectories below the current subdirectory. Invoke this batch file from the root, and it will report on every file on the entire drive that hasn't been backed up.

Mark Minasi

Tips & Tools

Cold Hard Disk

When I first turn on my computer, I get a message that says HARD DISK FAILURE PRESS F1. When I press F1, nothing happens. If I leave the computer on for 15 minutes and then reboot, it will come up and work normally. When I turn it off long enough to cool down, it again requires a 15-minute warmup. The drive has been high- and low-level formatted since the problem started. It won't even boot from a floppy until it has warmed up.

Charles W. Graham

The first recommendation would be to low-level format the drive on the theory that the tracks and the heads aren't in proper alignment until the disk has a chance to warm and expand slightly. Since you've already tried that and since your computer won't boot from a floppy, it's likely that one or more of your chips has begun to fail, either on the controller or on your motherboard.

If you have a friend with a similar drive, you might try swapping another controller board in to see whether that clears up the problem. If not, it would be a good idea to take the machine in to a competent repair facility.

Meanwhile, consider running the machine continuously. If you leave the machine on and shut off the monitor, the computer uses very little power, and you'll always have access to it.

Feedback

Clean Up Your Hard Disk

Use ERASE /P to help you clean out unwanted files from your hard drive's directories.

Erase now has the /P prompt option. Try typing ERASE *.* /P, and ERASE will prompt you with each file's name, as in "erase BANANA.COM Y/N?" I've found it the quickest way to clean out a directory when you want to save some files, want to erase some others, and can't use a wildcard erase.

Mark Minasi

Getting Started with Hard Drives

Don't Use SMARTDRV.SYS

Yes, it's free, but SMARTDRV isn't too bright (perhaps DUMBDRV.SYS would be a better name). It can actually slow you down if you've got a drive that does something called sector translation. This is basically a drive that doesn't tell the system the whole truth about itself. For example, a sector-translating drive with 2000 cylinders and two disk heads may tell DOS that it actually has only 1000 cylinders and four heads. Why would it do this? Briefly, PCs can't address more than 1023 cylinders on a hard disk. Such a drive could actually be slowed down by SMARTDRV. My suggestion is to get a copy of PC-Kwik Cache from Multisoft in Beaverton, Oregon. I've used PC-Kwik for years and have found it to be fast, bug-free, and reliable.

Mark Minasi

Getting Started with Hard Drives

Recheck Interleave

If your PC is slower than 10 MHz, rerun your interleave tests. If you're like many PC users, you've run a program such as SpinRite, Disk Technician, Optune, or any of a host of others that can determine the optimal interleave factor for your hard disk—that is, the arrangement of data on your hard disk that allows the fastest access to that data.

DOS 5.0, however, slows some I/O operations down by a hair, causing the optimal interleave value to change a bit for some computers

For example, the optimal interleave for an IBM AT—an 8-MHz computer—is 1:2 on DOS 4.01 and earlier, but 1:3 on DOS 5.0. (Thanks to my co-worker Rob Oreglia for that tip.)

Mark Minasi

Getting Started with Hard Drives

Reduce Hard Disk Cluster Size

Keep your logical drives under 128MB in size. If you're lucky enough to have a hard disk drive larger than 128MB in size, you'll probably be happy to hear that DOS 5.0 doesn't have DOS 3.3's 32MB maximum disk size. DOS 5.0 can actually format drives with sizes up to 516MB.

Even though that's the case, however, I recommend that you divide a big drive into logical drives no larger than 127MB. The reason is cluster sizes.

Clusters are the minimum space allocation unit under DOS; no matter how small a file is, it's allocated a minimum of one cluster of disk space. Clus-

ters are ordinarily 2K in size on most hard disks, so a ten-byte file really takes up 2K. Although the first ten bytes is the only data that counts in this file, DOS must allocate an entire 2K for the file.

If this sounds inefficient, it is, in some ways, and was one of the motivating factors behind the High Performance File System under OS/2 and in the new file system that will appear under DOS 6.0. Under DOS 5.0, however, clusters remain with us.

A logical drive larger than 127MB, however, has a cluster size of 4K—even more inefficient! So if you've bought a clone with one of those inexpensive Conner 212MB drives, don't format it as a single C: drive. Chop it up into 127MB for C: and 85MB for D:.

Mark Minasi

Getting Started with Hard Drives

Chapter 4

Video

What can you do without video? The quality and quantity of work you can do with your computer is probably more a function of the quality of your computer's output than any other single factor.

In this chapter you'll learn about

- Improving your graphics performance
- Helping the visually impaired
- Writing batch files that will run in graphics mode
- Graphics standards for cards and monitors
- Graphics file formats

Increase the Lines

Use the 43- and 50-line modes to get the most out of your EGA or VGA screen. If you've loaded `ansi.sys`, the `Mode` command will allow you to view 43 or 50 lines on a screen with the `mode co80,43` or `mode co80,50` commands. You get smaller—but still quite readable—lines on your screen, allowing you to see more with your text editor, spreadsheet, or whatever. Hey, you paid for that VGA, so get the maximum use out of it. (But remember, not every application can use the extra line modes.)

Mark Minasi

Getting Started with Graphics

Vision Help

Those who suffer from vision loss can still use computers. It's worth mentioning that although many sighted people assume that visually impaired people are unable to see anything, the vast majority of legally blind people can see to some extent and only need to have enlarged type or a color adjustment to see a computer display clearly.

The first product to look into is Eye Relief for Low-Vision Users (SkiSoft, 1644 Massachusetts Avenue, Suite 79, Lexington, Massachusetts 02173; 800-662-3622), a word processor designed for people with vision problems. It can expand the letters on the screen so that people with poor vision can see them easily. This magnification is limited to Eye Relief itself, however.

Telesensory (455 North Bernardo Avenue, Mountain View, California 94039; 800-227-8418) manufactures hardware and software screen enlargers that can enlarge the computer screen 2–15 times.

IBM has found many ways to ease computer use for the disabled. You can contact IBM's National Support Center for Persons with Disabilities at P.O. Box 2150, Atlanta, Georgia 30301-2150; (800) 426-2133. It has a TDD number as well: (800) 284-9482.

Robert Bixby
Feedback

Graphics Batching

You might assume that, like most utilities, batch files won't work in graphics mode. Not true—they work just fine. Showing remarkable foresight, the designers of the PC wrote the BIOS so that all text services work equally well in either mode, and DOS displays text with the help of BIOS services. So batch files will work. To try it out, create a file called TEST.BAT

```
REM TEST.BAT
PAUSE Note that text displays just fine in graphics mode.
```

Then fire up BASIC or GW-BASIC and run this short program:

```
100 REM Go to graphics mode.
110 SCREEN 2
```



```
120 REM Drop to DOS and run the
130 REM TEST.BAT program.
140 SHELL "TEST"
150 REM Wait for the user to
160 REM press Enter.
170 INPUT
```

Tom Campbell
Tips & Tools

Windows and Video

If you make money with your computer, spend all your time in Windows, and find that you spend most of that time waiting for screen redraws, bite the bullet and buy a high-speed video board, such as the NEC Multisync Graphics Engine, the Hercules Graphics Workstation board, or the fantastic new NDI Volante AT1000. They all cost around \$1000, but can redraw Windows screens in literally one-tenth the speed of a typical VGA board. Buying a 33-MHz computer won't help if your video board is a slow VGA.

Mark Minasi and Tony Roberts
Getting Started with Windows

Speeding Up Windows

While our tests show the relative improvement of changing from a standard Super VGA to a Windows/GUI accelerator card, this is not the only way to improve the performance of Windows and other graphical applications.

A software product, WinSpeed, claims to increase display speed performance under Windows by 200–500 percent. This product works with over 85 percent of the Super VGA cards on the market, including cards from ATI, Paradise, and Trident, as well as all cards using Tseng 4000 video controllers. WinSpeed comes from Panacea (800-729-7420).

A faster CPU also significantly increases video processing speed under Windows and other GUIs. For example, an i486-based PC with a Super VGA card will, in most cases, actually be faster than a 386 machine with a GUI accelerator. This point is worth considering if you intend to upgrade to a more powerful PC platform in the near future. If, after upgrading, you decide you still want faster performance from Windows and other graphical applications, you can always install a GUI accelerator at that time.

Tom Benford
Test Lab

Graphics Standards

Deciding which graphics standard is right for you is like trying to nail jelly to a tree. No matter how you approach the problem, it's bound to get messy.

In the fast-changing world of computer technology, we seem to have an endless succession of standards. The early video standard, CGA, was replaced by EGA; then EGA gave way to VGA. Now VGA is being superseded by Super VGA, and soon it will be replaced by XGA. Somehow they all coexist—or try to—for few of us can afford to replace our video cards and monitors every time a new standard emerges.

Things get even more complicated when you move to graphics file standards. Take just one file format: TIFF. There are currently five classes of TIFF files that can use any of seven types of compression. In addition, a TIFF file's byte order is different depending upon whether you're using an Intel or Motorola microprocessor. Programs that work with TIFF files try to read as many varieties as they can, but there's probably no program that can read them all. One programmer told me that his company had given up after accommodating over 30 different versions of TIFF files.

It creates a real dilemma—how do we know the standard that's popular today will still be supported a year from now? If we wait long enough to find out, we begin to bump up against the next bigger-better-faster standard. And if we buy a product that claims to support a standard, how do we know that it will work with our version of that standard? It's a complicated and confusing situation that gets worse each year.

What can you do? Before you buy a video card or monitor, pay special attention to the standards that are just around the corner. You may find it worth your while to spend more money for the next developing standard. Or you may decide to wait until that standard is more firmly established and within your price range. More than one graphics "standard" has proven to be a flash in the pan; MDA and Planatronics are two that spring to mind.

If you're buying a program that supports an unusual graphics file format, try out the program with some of your own files. Because some formats are optimized for certain kinds of printers, make sure that the format you're considering is suitable for your printer. Finally, experiment with the programs you already have to see if they can successfully convert from the new file format to other more popular formats.

Like a tourist who's advised to keep one hand on his wallet and both eyes straight ahead, we can be too cautious when we invest in computer hard-

ware and software. On the other hand, with computer technology moving faster and faster, it's good to keep an eye out for emerging standards.

David English

Getting Started with Graphics

Graphics Cards and Monitors

If you've ever scanned ads for computers, you've probably noticed those great prices that frequently omit the video hardware. At first glance this practice might seem chintzy—after all, a graphics card can add from \$30 to \$200 to the price, and a monitor from \$70 to \$600—and both are necessary. This is a legacy of the original PC and serves neatly to point out the incredible vigor and diversity of the PC marketplace.

IBM was commendably open-minded in the creation of the original PC at a time when the hobbyists who purchased micros were long on enthusiasm but short on money. Many of them relied on surplus stores for their hardware purchases, which often meant buying printers (more accurately, teletypewriters, or TTYs, for short) instead of monitors. That's right—many users didn't have monitors at all.

And some of those who could afford video hardware bought surplus video terminals for multiuser systems. These terminals had originally been designed to simulate—hold onto your hat—printers. Bizarre as it sounds, this actually made sense. Updating the 2000 or so characters on the screen—a chore your word processor performs thousands of times at each sitting—requires a lot of processor time and in those days, processors were very slow by today's standards.

Hardware designers rather cleverly borrowed the concept of the escape sequences used to control printers, enabling monitors to be hooked up to the computer via serial printer ports. Complex commands were reduced to a few control codes that were interpreted by the terminal, cutting down drastically on the data that needed to be pushed around. You probably won't be surprised to know that the designers of terminals and the designers of printers had incompatible methods of doing the same thing—often within the same product line. By the time of the arrival of the PC, this situation had passed through chaos and was rapidly approaching insanity.

IBM dealt tidily with the conflicting issues of proprietary advantages and compatibility (such as it was) by placing its control software into the BIOS of every machine it cranked out, at the same time allowing you to purchase industry-standard serial ports as an option.

If you wanted to buy an IBM monitor, great. They had monochrome for business, color for games and science, and even connections to a TV set for home. The monochrome monitor was similar to a high-quality terminal, with beautifully formed characters on a green screen. It required an MDA (Monochrome Display Adapter) card but couldn't do graphics. The CGA (Color Graphics Adapter) card drove an RGB monitor capable of 16 colors in text mode and 4 in the most commonly used graphics mode, which had a resolution of 320 x 200 pixels.

IBM sharply underestimated how closely buyers would hew to the party line. Almost no one used terminals with the PC, instead choosing to buy IBM monitors. That strange 40-column option is included in your PC (try it from DOS, if you have a color monitor, by issuing a `MODE CO40` command) because IBM expected a large percentage of its customers to use TVs for monitors. They didn't.

The BIOS had control software for all of the PC's I/O devices—screens, disks, printers, serial ports, and so on—but the video software was perhaps the most elegant part of its design. First of all, it had a full host of cursor, text, and color controls that work equally well in text and graphics modes. This is remarkable, given the relative scarcity of graphics applications at the time. Second, the BIOS was much faster than terminals. It's easy to see how the BIOS text routines must have seemed fast at the time, not sluggish as they're thought to be now. Third, from its inception, the PC planned for device independence. That is, if programmers stuck to the BIOS for their text manipulation, IBM guaranteed they would never have to rewrite their software, no matter which video system it runs. IBM has held its promise to this day, but 1-2-3 dealt that promise a fatal blow.

Lotus 1-2-3 ran in both text and graphics modes, and its designers, anxious to squeeze every cycle of performance they could out of the PC, chose not to use the BIOS. That meant having to write different screen-handling code for monochrome and color screens. They also chose to support two non-IBM video systems—the Hercules card, a then-obscure product that managed the feat of drawing high-resolution graphics on users' existing IBM monochrome monitors with a then-stunning 720 x 348 resolution, and Compaq monitors, which sported a CGA-like screen at 640 x 400. Lotus 1-2-3 did this by employing replaceable video drivers, a trick many developers have since borrowed.

As the new Compaq and Hercules video systems showed, people were becoming impatient with the limitations of IBM's video hardware. The wait ended with IBM's introduction of EGA, which was upwardly compatible with

CGA but offered 16 colors at 640 x 350 resolution. At this same time, a card intended for CAD workstations, called PGA, was also released, but IBM was never able to do much with it. Clone manufacturers didn't even bother.

EGA required a lot of then-expensive video memory, so it had a monochrome mode and normally came with 64K memory, not enough for full-color operation. (That's why you should be careful, when buying a used EGA, to make sure it has the full 256K on board.) EGA had its own BIOS, and IBM again tried to assert that using the BIOS was the only way to go. Once again people found that bypassing EGA's system software offered better performance. A few clone manufacturers jumped the gun, creating EGAs that were only compatible at this level. Another warning: Should you buy a used EGA, make sure it's register-level compatible.

EGA was quickly improved upon by manufacturers of video boards wishing to distinguish themselves with superior but incompatible technology (sound familiar?). EGA clones with 800 x 600, 800 x 400, and other resolutions quickly appeared, but they required special drivers.

About the time standards committees for the extension of the EGA standard began to appear, IBM resurfaced with VGA (which was announced with the PS/2) and the 8514. The 8514 has a maximum resolution of 1024 x 768 but causes a distressing flicker in that mode. It has met with about the same success as PGA. VGA's most popular modes are 640 x 480 (its maximum resolution) with 16 colors and 320 x 200 with 256 colors. A standard VGA requires 256K to support all the graphics modes, but when VGA was first released, it wasn't always sold with a full complement of memory.

One of the most subtle improvements of VGA is its use of square pixels—all previous IBM video modes used rectangular pixels. With rectangular pixels, a screen dump of a circle prints as an oval, an artifact people were reluctant to accept after the square-pixeled Macintosh was introduced. The technical term for the squareness of pixels, or lack thereof, is *aspect ratio*. VGA is said to have an even aspect ration.

The cloners got it right with VGA. They went for full compatibility, and the market paid them back handsomely. From the outset, no one pretended that VGA resolution would be enough, however, and a standards committee was formed before irreparable damage was done. The VESA (Video Electronics Standards Association) committee established an 800 x 600 display mode for Super VGA video cards in 1989 and a similar standard for Super VGA monitors in 1990. The Super VGA standard is already supported by most clone manufacturers and will almost assuredly stick.

IBM, not surprisingly, chose to ignore the Super VGA standard with its recent introduction of XGA. Sporting a graphics coprocessor, 1024 x 768 resolution, and a new BIOS, XGA is a vision of things to come.

Graphics coprocessors, like numeric coprocessors, speed up certain operations when special software drivers are used. XGA apparently uses a proprietary coprocessor, but developers who follow the BIOS can use other ones—the most common are from Texas Instruments. Coprocessor cards are currently used only by people with extremely demanding needs and big budgets. A typical monitor and card combo can set you back \$3,000 or more.

Tom Campbell

Getting Started with Graphics

Upgrading Video

Ready to get rid of your CGA or EGA video? It's a great time for that—upgrades have never been less expensive, and there are lots of options, all starting at what used to be the high end: VGA. Here's a quick look at how to make your video faster, sharper, and more colorful.

Upgrading video means buying and installing a new video board and a new monitor. Your video board determines which kinds of images your computer can display. The monitor must follow the video board, so first pick the board, and that will determine the kind of monitor you need.

Video boards have three major characteristics: resolution, color depth, and interlace. There are other concerns, such as how much RAM should be on the video board, but they follow from the original three and are mainly relevant to performance, rather than capability.

Mark Minasi

Getting Started with Video

Resolution

Resolution is the number of pixels—or dots—on the screen. The more pixels, the sharper the image. CGA can display 320 horizontal dots by 200 vertical dots or 640 horizontal dots by 200 vertical dots (most video boards support multiple resolutions), no match for VGA's 640 x 480. There's a video standard between CGA and VGA that's called EGA, but don't even consider it. It's no less expensive than VGA, has lower resolution, and is less flexible.

Many third-party manufacturers have improved on the basic VGA with something called Super VGA (SVGA for this article). Among other things, it

offers improved resolutions of either 800 x 600 or 1024 x 768. A few even achieve (at much greater cost) 1280 x 1024.

Mark Minasi

Getting Started with Video

Color Depth

Color depth is the number of colors that are visible with a video board. CGA can show 4 colors, EGA 16, and VGA 16. But it's a bit more complex than that. EGA, VGA, and later boards use a palette that allows adjustment of the 16 colors. More specifically, EGA can display 16 colors chosen from a palette of 64 colors; VGA, on the other hand, can display 16 colors chosen from a palette of 262,144 colors. That means a clever programmer can do some amazing things with VGA.

VGA also sports a 320 x 200 mode that can simultaneously display 256 colors (again, out of a palette of 262,144). This is the video mode that is so crucial to many of the fantastic games that have appeared for the PC since VGA's inception. To see an amazing example of just what you can do with the 320 x 200 mode with 256 colors, get a copy of the game *Wing Commander* from Origin. It's true arcade quality in a PC game.

That underscores an important point that most people don't understand when buying computer equipment: the importance of colors. It seems reasonable that the best computer display is the one with the greatest resolution, but that's not really so. What makes your eye happy is seeing lots of colors, and it'll accept lower resolution. Take TV, for example: It's got resolution worse than CGA but millions of possible colors, and your eye is quite happy with the results. Most business VGA work gets done in the 640 x 480 mode with 16 colors. That's how Windows works, for example, and it's a shame—16 colors just don't show off VGA.

For more colors, look to the SVGAs. Not only do they sport improved resolution, but most SVGAs offer a 640 x 480 mode with 256 colors. Viewing a GIF or other scanned color image in Windows under a 256-color mode is startling; it's as if you're looking at a magazine picture. A caution, however—when you're running Windows in a 256-color mode, it's noticeably slower than when in 16-color mode, so you may have to switch the video mode to suit the program you're running. (The only differences are in your `SYSTEM.INI`. Look for the lines `display.driv=` in the [boot] section and `display=` in the [386enh] section.)

Most of us aren't ready for it yet, but Windows also supports a 16-million-color mode. A few video boards can offer 16 million colors (also known as 24-bit color), and they're becoming more common and less expensive. SVGAs that offer 256-color modes, on the other hand, are quite common.

Mark Minasi

Getting Started with Video

Interlace

The third characteristic is interlace. Interlacing refers to a sneaky trick played by monitor manufacturers, a trick first used in TV. In order to make TV look as if its resolution is higher than it actually is, each TV screen is shown, not all at once, but as a pair of screens—the even-numbered lines followed by the odd-numbered lines. The whole thing's supposed to end up looking like double resolution, and it works moderately well for TV (recall that resolution isn't that important for TV anyway). But computer displays are a slightly different matter.

Interlacing computer displays leads to an apparent increase in resolution, which is a good thing—you get high-resolution performance out of a less expensive low-resolution monitor. But there's a price; the screen flickers. You'll get headaches from working with an interlaced video display—so be careful. Many 1024 x 768 video boards are putting out interlaced signals so that you can use the boards with less expensive monitors. Examples are the IBM 8514/A, XGA, and about half of the SVGAs that offer 1024 x 768 resolution. The advice here is simple; avoid interlacing or buy the extra-large bottle of Excedrin for the headaches you'll get while looking at it.

Mark Minasi

Getting Started with Video

Other Desirable Features

What else is desirable in a video board? Whether you're buying SVGA or VGA, you can get better performance from a board that has a 16-bit interface and VRAM rather than DRAM.

The original PC expansion boards could transfer data to and from the PC's CPU in 8-bit packets, so they're referred to as 8-bit boards. Some VGAs are 8-bit boards. Later boards are 16-bit boards, meaning that they transfer data twice as fast, in 16-bit packets. A 16-bit board's greater transfer speed means graphics get zapped up on the screen faster, so buy 16-bit VGA.

Video boards also contain memory. A basic VGA board has 256K of RAM on it. This RAM isn't part of what the system counts when it does the memory count on power-up—it's the memory that the video board uses to remember what's on the screen at the moment. More resolution and colors mean more memory. Most SVGA boards need 512K or a whole megabyte of onboard memory.

This RAM must serve two masters. It not only has to accept data from the CPU, but it must also provide data to the dedicated video hardware on the video board. This presents a problem to common RAMs, called DRAMs (Dynamic RAMs). Extra circuitry is needed to ensure that when both the video hardware and the CPU want to communicate with the RAM, one waits—it can't communicate with both at the same time. Unfortunately, that slows down screen performance.

Most video boards are built with DRAMs because they're inexpensive. A few use a different dual-ported RAM, one that both the CPU and the video hardware can access at the same time without any trouble. That RAM is called Video RAM (VRAM). Headlands Technology's V-RAM board uses VRAM, as you'd guess. VRAM is considerably more expensive than DRAM, so don't expect to see it on the inexpensive boards. IBM's new XGA also uses VRAM.

Mark Minasi

Getting Started with Video

About Cost

A plain-vanilla VGA board can be as little as \$60. Super VGA boards can be as little as \$80 or can go on the street for as much as \$400. If you're going to buy plain-vanilla VGA, here's some advice: Buy a no-name clone. It'll run all the standard VGA software without any trouble, and it won't cost much. But if you're going to buy a Super VGA board, buy a big name. Why a big name? Simple: Super VGA is no good without the Windows drivers to use it. (Drivers are pieces of software that support hardware. A Super VGA board needs special drivers to exploit its full abilities.) You'll get Windows drivers with your new SVGA even if you buy your SVGA from a no-name outfit, but will the no-name SVGA maker be around to supply drivers for future versions of Windows? If not, you'll end up using the plain-vanilla VGA driver. Without a special driver, your nifty SVGA will act just like a boring old VGA. So go with a big name.

Which big name? My favorites are ATI, Orchid, and Paradise.

Mark Minasi

Getting Started with Video

Choosing a Screen

If you need a VGA monitor, you've got three basic choices. If all you're doing is basic VGA, you'll need a fixed-frequency VGA monitor, and it'll only set you back about \$250. If you're going to do 800 x 600, you'll need a compatible multisync monitor. The NEC 3D is the most popular. Panasonic's C1381 will do an equal job for less. You can only do 1024 x 768 interlaced with either of those monitors—remember that interlacing makes a monitor seem to have a resolution that it really doesn't have.

Be very careful if you're buying 1024 x 768! Since most of the 800 x 600 monitors will do 1024 x 768 interlaced, many dealers advertise these monitors as 1024 x 768. Double-check before buying a 1024 x 768. For 1024 x 768 noninterlaced, look to the Sony CDP1304, a high-end monitor with a midrange price. If you need high resolution, this is the monitor for you; the closest competitor's price is in four digits. And it never hurts to check with the tech support folks at the makers of your video board. They're often able to steer you in the right direction when you're looking for a monitor and may save you a couple of bucks.

A final thought for those with a little more money—video-coprocessor boards based on the TI34010 and 34020 chips can literally speed up the video performance of Windows by a factor of twenty or more. These speed demons typically supplement, not replace, your VGA and used to cost over \$1,500. One sells now for a low \$595 list: the Squeegee (it makes your Windows clearer—get it?) from Spectragraphics. I flatly can't believe how much faster it makes Windows; PageMaker becomes usable on a 16-MHz SX with this board.

Mark Minasi

Getting Started with Video

Vector and Raster Graphics

Leonardo da Vinci was able to get by with the paintbrush and oil paints he made for himself. But he could have used anyone else's oils without a second thought. It's not that easy with graphics files. First, you need to know that they come in two varieties: vector and raster. Once you know the characteristics of each, you're most of the way there.

Here's a rundown of the pluses and minuses of each kind of image. Raster images are perfect for scanned images and anything that requires dot-for-dot alignment onscreen or for presentations that will be given on a computer. They generally display faster because they're usually stored in a manner that

closely mimics the screen layout. Because color information is stored for each dot on the screen, they get big fast. Even with compression, raster-based graphics files range from about 20K for a simple black-and-white image to 200K or more for a complex VGA image with 256 colors.

Vector files are good for technical illustrations and data-driven images, such as charts and graphs. They're also the only game in town when high-quality output is necessary, as when creating slides. If file size is critical, vectors also come out on top. A complex CAD image can take up as little as 40–50K (although it can also move into the hundreds of kilobytes); a simple chart can take as little as 4–5K. Vector images also preserve the characteristics of text; you can always change the text style in a vector image.

You can easily translate vector images to raster format—the raster file is just another output device for the vector information. The reverse is slowly becoming available but represents a solution only in limited situations. Trying to find a picture of an oval in a raster image, for example, and converting it to the “draw an oval” instruction in a vector file (a technique sometimes called autotracing) is fraught with peril. It involves pattern-recognition techniques that verge on artificial intelligence, plus a lot of hand tweaking. Use it only in dire emergencies.

Tom Campbell

Getting Started with Graphics

Raster Team Lineup

Here is a run-down of the popular raster file formats.

PCX is the most common raster file format. It was pioneered by ZSoft for its PC Paintbrush program (you'll find it in Windows modestly renamed Microsoft Paintbrush by Microsoft). It was also given away with zillions of early Microsoft mice. PCX files can be handled by just about any graphics program with a connection to the outside world. They come in several flavors because ZSoft had to upgrade the file format each time IBM issued a new graphics standard. The three main types now are for EGA, 16-color VGA, and 256-color VGA. Many programs support only the first one or two file types.

MacPaint is a Macintosh format. The original MacPaint format is supported by many programs because it's intelligent and limited to black-and-white. Good Mac programs never did hard code their screen coordinates, so the MacPaint format supports any screen size. Many clip art images are avail-

able in MacPaint files but sold on PC disks.

TIFF is the most common format used by scanners. Its origins are interesting. It's logical to think that graphics professionals would have a standard of some sort. Get a group of manufacturers together to decide a common means of describing image size, color information, and compression techniques to make files smaller, and you can go a long way toward machine independence in raster files. That's exactly what TIFF (Tagged Image File Format) does.

TIFF even goes beyond those goals. It works equally well on Mac and PC and has a well-defined list of subset implementations. The four subsets are called classes and include Class B, for Mac-style black-and-white images; Class G, for gray-scale images such as those produced by a gray-scale scanner; Class P, for EGA- and VGA-type graphics cards; and Class R, for RGB, which is used on very high-priced graphics cards such as the Targa or Number Nine boards. A new class for faxes, Class F, has emerged, but it isn't sanctioned yet by the keepers of TIFF.

Tom Campbell

Getting Started with Graphics

Vector Team Lineup

Now we'll talk about the most popular vector formats.

CGM stands for Computer Graphics Metafile. It's an ANSI standard that's been supported by mainframe computers for years and is now used by such programs as Harvard Graphics, Lotus Freelance, and Zenographics' Pixie. It doesn't handle text gracefully, so PostScript is better if preserving all aspects of the text is critical. CGM allows raster images to be included with the vector file, but the raster format is poorly designed.

PostScript is more than a graphics format. It's actually a language that comes with many high-priced printers such as the Apple LaserWriter. It's becoming more popular on PCs thanks to the introduction of programs that can turn your inexpensive printer into a PostScript machine. PostScript, like CGM, can also include a raster image in its files, and it does a better job than CGM.

WordPerfect WPG files were once a dark horse in the graphics world. They can be either raster or vector. Many clip art vendors sell their files in WPG format because of WordPerfect's incredible popularity.

Tom Campbell

Getting Started with Video

Graphics Conversion Programs

The PC wasn't designed to be a graphics machine (merely a machine that could support graphics). That created a problem for software developers: How should graphics programs store their images?

Word processors had ASCII; telecommunications had the Bell 212A and Hayes-modem standards. Because IBM didn't come out with graphics programs until long after others had pioneered the market, vendors were left to their own devices.

Those with a mainframe orientation chose CGM, a vector format with middling text abilities. ZSoft made PC Paintbrush a hit, and its not-so-comprehensive PCX files became a de facto standard. Autodesk's influential but expensive AutoCAD brought DXF files to the masses.

Apple traded on the PC's weakness by establishing open, systemwide formats for Macintosh bitmap and draw graphics—adding to the confusion (while justifiably boasting about its tight interapplication integration). Ironically, the Mac's own deficiencies brought PostScript into the fray, which added again to the confusion and provided even more file formats.

Without a standard, there was a crying need for programs that would translate one kind of file format into another. Into the mix stepped HiJaak (In-set Systems, 71 Commerce Drive, Brookfield, Connecticut 06804; 203-740-2400; \$199) and ImPort (Zenographics, 4 Executive Circle, #200, Irvine, California 92715; 714-851-2266; \$295). These capable utilities translate among the many graphics formats.

What HiJaak and ImPort do is much easier to describe than to implement. They take a file in one graphics format and spit it out in another. They aren't paint or drawing programs, which let you create and edit pictures. (HiJaak doesn't even let you see the images you're converting—you'll need the original graphics programs for that.) But before you can choose which graphics conversion program is right for you, you should ask these questions.

- What do you need? While this may seem like an obvious question, it can be crucial, if you have a job involving large numbers of images in a certain format. For example, both programs handle CGM files, but ImPort often makes more intelligent guesses about certain varieties of CGM files. It has a powerful means of tweaking the translation process, called MAPfiles. HiJaak, on the other hand, handles many more image formats.
- Does it do Windows? The nature of graphics translation fairly cries out for

a multitasking environment—you often find yourself wanting to go back to the program that created an image in order to edit it a bit more. HiJaak deals with this by operating as a TSR under DOS; its only Windows component is a screen-capture utility. ImPort is a Windows program at heart. If you live in Windows, it's the only way to go. I also found ImPort to be much more stable than HiJaak in interactive use.

- Do you need to see what you're doing? If you have a large number of images but can't remember which one is which, ImPort may be a better choice with its graphics preview. With HiJaak, you work blind.
- How many images are you converting? HiJaak is preferable in batch mode, because it can be operated from the DOS command line for an unlimited number of files (ImPort's batch mode is limited to 36 files at a time). If you only need a few files converted, point-and-shoot methods are probably faster. But if you move a very large quantity of images every day, HiJaak is hard to beat.
- Do you need vector-to-raster conversion? Only HiJaak lets you take vector images, such as those produced by Lotus 1-2-3 or Harvard Graphics, and convert them to raster formats, such as PCX files or Windows bitmaps. (Even HiJaak can't translate from raster to vector.) You may never need this, but if you do, there's only one game in town.

HiJaak is a DOS program that supports a staggering variety of input and output formats, from PostScript to fax to PCX to Macintosh. As a by-product, it deals brilliantly with capturing screens and printing them on a laser printer.

The HiJaak user interface is something only a mother could love; it manages to complicate even the simplest of tasks. I found it unstable at times, especially in TSR mode, but it's adaptable. You can operate HiJaak as a TSR, from the command line, or interactively.

What HiJaak lacks in finesse it makes up for in versatility. Besides a wide array of graphics formats, some that aren't even native to the PC, HiJaak can't be accused of shallowness, despite its breadth. LaserJet soft fonts can be converted, AutoCAD shape libraries and 3-D views are supported, and Windows metafiles can be greater than 64K. These are just a few of the cases where HiJaak goes well beyond what you would expect from a conversion program.

ImPort is a Windows animal, offering as output only Windows metafiles, Clipboard files, PageMaker metafiles, and CGM files (its sole non-Windows file format). Zenographics has years of experience with CGM, which ImPort deals with very well. ImPort is about as easy as a Windows program can get, sporting detailed online help that you may never need and a nearly foolproof

conversion process. The manual is better laid out than HiJaak's and easier to jump into at random, but its descriptions of the input formats aren't quite as deep as HiJaak's.

ImPort reads several popular varieties of CGM, Lotus PIC, AutoCAD, HPGL, SCODL (for film recorders), and VideoShow (an electronic presentation device). It doesn't handle AutoCAD's shape libraries or 3-D views. Every input format has an Options screen, and some of them can be additionally dealt with via MAP files, which act as a sort of miniconfiguration language.

ImPort's user interface can't be beat. It's solid as a rock and very intuitive. A major advantage is that the image appears onscreen as it's being translated. You can queue up dozens of files at once using the Batch option, since Windows' point-and-shoot becomes a grind when you have a repetitive task.

Both products are mature. Neither product tends to shy away from exposing you to the tough choices you need to make when converting formats that aren't functionally equivalent (which is almost always the case). If there's a chance that a color assignment, font format, or shading pattern may not come out as you'd like, you'll be able to second-guess the product. Both have good manuals.

On the other hand, there are pronounced differences. HiJaak supports many more input and output formats, but its user interface is sorely in need of an overhaul. It's the only one with raster-to-vector conversion. It runs under DOS, has a tricky but usable TSR format, and is unparalleled in its handling of screen captures for laser printers. ImPort is a lot easier to learn and use because it lives and breathes Windows.

If only one of them fits your needs, you can rest comfortably because both are solid products. If you can afford both, by all means get them. Either way, you won't be disappointed.

Tom Campbell

Getting Started with Graphics

Windows Graphics

Everyone knows that graphics can make your point more vividly than plain text alone. But the extra complexity of graphics brings its own problems—in particular, the problem of how to store and transfer graphics information.

Graphics information must be represented in some way. Simple text is easy to represent—the computer world has used ASCII as a text standard since 1967. But graphics information hasn't really congealed into a single standard. There's GEM, PCX, MSP, RAS, Windows Metafile, Presentation Manager Metafile, Macintosh PICT, TIFF, CGM, NAPLPS, Lotus PIC, AutoCAD

DXF, GIF, BMP, and many more.

Why so many formats? Graphics formats come from two sources: video hardware vendors and graphics software vendors. If your firm is offering the latest and greatest video board, you want to be sure that there's a graphics format that (a) shows off the board's capabilities and (b) runs quickly. Quickly? Sure—different file formats are adapted to particular hardware. Software companies come up with graphics formats for similar reasons. A particular graphics format may make programming simpler or faster, or may save space at the expense of speed. There's no best graphics format.

Besides, you don't always want a general-purpose image format. A special-purpose file format might be a lot less demanding of disk space. (If you don't know it already, you'll soon find that images take a lot of disk space. A single VGA image in 256 colors can take up half a megabyte.)

And the two sources of video standards—hardware vendors and software vendors—may conflict. You just plain can't display some kinds of images on CGA video boards—the resolution and the number of colors are inadequate. EGA even falls short in displaying all but the most simple images. Its resolution isn't bad, but it can only take colors from a very meager palette of 64 hues. VGA's palette of 262,144 colors really makes it the first general-purpose hardware standard, one that can adequately handle most software graphics standards.

So what are the popular formats these days? ZSoft's PC Paintbrush made the PCX format popular, PCX files are hardware-specific—a PCX file generated on a machine with an EGA board will look different from one generated on a machine with a VGA board. Aldus introduced TIFF (Tagged Image File Format) to accommodate scanned images, but it's also a good general-purpose format not tied to any hardware. Windows uses BMP, a format designed to support DIBs—Device Independent Bitmaps. (Bitmap, by the way, is just a word for a graphical image described as a series of dots.) CompuServe's Graphic Image Format (GIF) is a popular and space-saving way to store scanned images, and there are lots of GIF files around on CompuServe and other online image banks.

Which should you use in Windows? Your favorite Windows program may only support one format, in which case the decision is made for you. The most important consideration is what you will do with the image. For example, if you plan to bring the image into a PageMaker document, it'll work best as a TIFF file. Check your application closely. Many applications claim to support many graphic file formats, but on closer inspection you'll see that

they have a particular favorite.

One common graphics problem with Windows is screen captures. You're writing a manual on how to use a Windows program and need a screen capture—how do you do it? In Windows, it's simple: Just press the PrintScreen key, and the contents of the screen are saved to the Clipboard. You can then paste the Clipboard contents into your target application, such as Word for Windows, and you're done. To capture a single window, click on that window and press Alt-PrintScreen.

Many Windows novices get caught in the following trap. They PrintScreen the screen to the Clipboard and then try to paste the screen into Paintbrush. It doesn't work—you'll only get part of the screen. A better answer is to use one of two shareware programs: WinGIF or SnapApp. Both are on CompuServe, BIX, and other online services.

To use WinGIF, just load it and press PrintScreen. Then paste the contents of the Clipboard into WinGIF, and you've got a screen capture. You can then save the contents as either a BMP or GIF file.

SnapApp is even more versatile. You just start it up and set a timer. When you want to grab a screen, you start the SnapApp timer going. While the timer is counting down, you can get the screen just as you want it—grab whatever menus you need pulled down, open whatever windows you need, and the like. When the timer's done, the screen is saved as a BMP file.

I use both programs and find them indispensable. Knowing how to do Windows screen captures is a good thing, as it can sometimes be the only way to grab a Windows-based picture.

We've seen where standard formats come from, how to pick them, and how to put Windows screens into the fairly standard BMP format. But what about conversion?

You can buy some very good graphics file conversion programs. Probably the best is HiJaak from Inset Systems. HiJaak handles virtually every format under the sun.

If you don't want to part with too much cash, however, there's another way. You may find that some of your current applications already have a conversion capability built right in. For example, Paintbrush can read or write BMP or PCX files. That means that you can read in BMP and write out PCX—a free file conversion utility. WinGIF can do the same for BMP and GIF, and at \$15 it's a steal. When I purchased a Hewlett-Packard ScanJet scanner, it came with HP's Scan Gallery scanner-control software. In addition to the other things Scan Gallery does, it can read TIFF and write PCX. So there's a ton of

low-cost or free conversion utilities.

Finally, when tackling a graphics conversion problem, don't forget the Clipboard. I use two Windows drawing programs, CorelDRAW! and Micrografx Designer. They're both good packages, but each lacks important features that, thankfully, the other contains. So I often find myself trying to ship a drawing from Corel to Designer or vice versa. Both packages claim to be able to handle dozens of file formats, but—recall my advice a few paragraphs back—they really work well with only a few. The ones Corel doesn't like, Designer does like, and vice versa. The answer? The Clipboard. I just copy a Designer diagram to the Clipboard, flip over to Corel, and paste the diagram in. No problem.

Graphics formats are here to stay. A few will probably go by the wayside, but we'll probably always have PCX, TIFF, BMP, and GIF, at a minimum. Getting comfortable with them now will make your Windows cutting and pasting much easier later on.

Mark Minasi

Getting Started with Graphics

Chapter 5

Communicating

No computer is an island. And when you connect your computers to each other, you multiply their power. Here's the scoop on telecommunications, long-distance management, professional communications, and little networks.

In this chapter you'll find out about

- Modems and how they work
- How to upgrade your serial port
- How managers manage from halfway across the country
- How to decide when it's time to put your PCs on a network

Where Modems Came From

If you spend much time on computer data services such as PowerVision, CompuServe, GENie, America Online, or, for that matter, any of the thousands of private bulletin board systems (BBSs), you've had to set up some kind of communications software. Are terms such as MNP, XMODEM, YMODEM, V.32, and the like confusing you? Then read on.

It may help to start with a statement of the overall purpose of communications. The point of communications is to get bytes of data from one point to another as quickly and reliably as possible. That's where this whole mess

started. So when you hear a new communications buzzword, ask, "How does this help me get data from point X to point Y?"

In the late seventies and the early eighties, the first BBSs appeared. Modems then typically transmitted at 300 bps, and the kind of data that was being transferred was usually text: messages or BASIC program listings.

In those early days, you'd transfer a file by setting your computer to capture mode, which meant that it would copy every incoming byte to a disk file. Then you'd tell the distant computer to list the file you wanted to receive, as if your only desire were to read the file as it scrolled by on the screen. The capture feature saved the file to disk as it appeared on your screen. When it was finished listing, you'd close the file, and you'd have your BASIC program transferred. There would be some extra trash above and below the file, but you'd just load the file into a text editor and trim that off.

Mark Minasi

Hardware Clinic

Error Correction

Now and then, however, the transfer would become garbled because of phone line noise. In that case, you'd see the garbled characters, and you'd tell the remote system to resend the file.

Hopefully, it would come through OK the second time. If not, you might conclude that you'd just happened to get a noisy line today, and you'd just hang up and dial again, hoping for a better connection. This was called phone line roulette.

In this case, there were error-detection and error-correction mechanisms. The detection mechanism was you, the human operator, noticing that the incoming data looked wrong. The correction mechanism was also you, requesting a resend. This crude system worked for two reasons.

First, you were transmitting at 300 bps. (Never say baud; no matter what you've been told, it doesn't stand for bits per second.) The lower the data rate, the lower the error rate. Bad bits appear on a normal phone line once in a blue moon at 300 bps; they can appear every minute or so at 9600 bps. Error correction was less necessary because errors just plain didn't occur.

Second, the kind of data that you were transmitting could stand up to an error or two—it was mainly English text. If you saw an incoming line of BASIC that read PRONT "Hello," you knew that PRONT was PRINT garbled. The built-in predictability of English helped the error-correction process.

As time went on, 1200-bps modems became more popular. BASIC list-

ings were replaced on bulletin boards by COM and EXE files, files that don't mean anything when viewed by the human eye.

So a BBS operator named Ward Christensen in the Chicago area invented a simple method for transferring data, a method that transfers data while simultaneously finding and correcting data garbled by transmission noise. He called the method XMODEM, and it looks something like this.

Say station S (the sender) is sending a 400-byte file to station R (the receiver). Both sides of the conversation must be running a program that manages a transfer according to the rules of the transfer. You do that whenever you tell your system to transfer with XMODEM. This insistence on both sides agreeing is the linchpin of communications protocols. Here's how the XMODEM technique works. (Because both sides are controlled by a computer, people don't have to worry about this stuff, except for issuing the commands to S and R to get going.)

First, the sender must ensure that the receiver is ready to receive the data. It does this by waiting for a particular one-byte signal from the receiver, an ASCII code 21, also known as NAK (negative acknowledgment).

There's no significance to this character—it was just picked at random. When R says NAK to S, R is saying to go ahead and start transferring. If you wanted to, you could generate a NAK from your keyboard by typing Ctrl-U.

S is going to send the data to R in 128-byte blocks. Before the 128 bytes of each block, however, it first sends an SOH (Start Of Header) signal, which is just an ASCII 1, something you could generate with a Ctrl-A. You've seen ASCII 1 before; it's the smily face that shows up when you type a COM or EXE file to the screen.

After the SOH, S sends another byte, a block number byte. The value of the byte is 1 for the 1st block, 2 for the 2nd, and so on. As bytes can only hold values up to 255, the value wraps around after 255. The 256th block would be numbered 0, the 257th would be numbered 1, and so on.

For the sake of redundancy, the third byte repeats the block number—but in another way. S subtracts the block number from 255! The second block number for our first block is, then, 255 minus 1, or 254. Then S sends the 128 bytes of data. The block's almost finished, but there's one more byte to go.

Recall that the whole purpose of this exercise is to be able to detect errors. S now adds something called a checksum that will allow R to detect errors. The sender S takes all 128 bytes of the data block and treats them as if they weren't ASCII characters or binary data, but just a string of 128 numbers. It then adds up the 128 numbers to get a sum. That sum is then divided by

256. The remainder, believe it or not, is the checksum. (This makes better sense when you do it in machine language; Ward knew what he was doing.)

Here's an example. Suppose we had a block of not 128 characters, but, for ease of use, 11 characters. Let's use my name in uppercase letters: MARK MINASI. Remember that it's 11 characters, not 10, because of the space between the first and last names. The ASCII code for M is 77, A is 65, R is 82, K is 75, a space is 32, M is 77, I is 73, N is 78, A is 65, S is 83, and I is 73. Add them up, and you get a total of 780. Divide 780 by 256, and you get 3 with a remainder of 12. So 12 is the checksum.

S has now sent the first block. It was 132 bytes long—3 bytes in the header, 128 bytes of data, and 1 byte of checksum. Now let's see what R does with the block.

First, it looks at the block number to make sure that it makes sense—if block 27 arrives right after block 10, something's wrong. Assuming there's no trouble, it next examines the 128 bytes of data, ignoring the checksum for the moment. Using the 128 bytes of data, it computes its own checksum in the same way that the sender did. Now R examines the checksum that S sent to be sure it's identical to its own.

This is the error-detection part—the checksums must be the same. If they are, R signals S that all is well by sending a single byte, an ACK character. ACK (positive acknowledgment) is ASCII code 6, or Ctrl-F. If the checksums don't match, then the error-correction part comes in, and R sends a NAK code. When S receives the negative acknowledgment, it resends the data block. R checks the resent data block, and, hopefully, all is well. If not, S just keeps resending and R just keeps NAKing until they reach max NAKs, at which point the transfer is terminated. Assuming the first block has been received correctly, S then sends the next 128 bytes of our 400-byte file. Once that's been acknowledged, there's a third block, and finally there are only 16 bytes left. The 16 bytes are filled out with either end-of-file characters or null characters and then sent. Once that has been acknowledged by R, S says, "That's all, folks," by sending an EOT (End Of Transmission) character, which is ASCII 4, or Ctrl-D. A final ACK from R ends things.

A couple of things may be nagging at you about this protocol. First, why send the block number twice, and second, why subtract from 255? The first question is easier: The block number is sent twice simply for insurance. Remember that we don't trust the phone lines. This is a fairly common practice in communications and, for that matter, in real life. If you've ever heard an announcement like "Mr. Jones, Mr. Jones, please pick up the white courtesy phone" in an airport, you might ask yourself why the announcer said Mr.

Jones's name twice—was he supposed to pick up the phone twice? Of course not. The announcer just wanted to be sure that Mr. Jones heard his name.

But why subtract from 255? I thought I'd try asking the source himself, so I dropped a note on CompuServe to Ward Christensen. His answers were very helpful. "Why not?" he responded with a grin. "Actually, if a line glitch occurred that changed a particular block number to something else, there's a chance it might do two at a time." Thus, anything that affected, say, all the 1 bits would damage both copies of a block number, if both block numbers in XMODEM were equal. By subtracting from 255, there's a side effect of converting all the 1s to 0s and vice versa. Taking a binary number and converting its 1s to 0s and 0s to 1s is called taking its complement.

Ward observed that, in the case of the systematic error that always damages 0s or 1s, "the complement is not likely to get similarly zapped. Also, the block number isn't in the checksum, because I wanted it separately checkable." This provides an internal block check mechanism—but that's not the only reason for this method. Ward explained that one of the popular processors of the time was the 8080 (no, that's not the 8088; the 8080 predates the 8088 by about eight years). It had a built-in instruction that made using the complement for checking a simple matter.

That's XMODEM in some detail. We needed that detail to understand how you can speed up your file transfers without buying a new modem or new software.

XMODEM was the first attempt in the PC world to solve the problem of transporting data over phone lines and ensuring that any errors in transmission were caught and automatically corrected.

Mark Minasi
Hardware Clinic

New Protocols

XMODEM has been largely outclassed by newer transfer methods, but it retains a great strength—it's ubiquitous. You can find the old guy everywhere. Every communications program supports XMODEM, at a minimum.

Nonetheless, XMODEM has four deficiencies. First, its block size is too small and makes for inefficient transfers. Second, it requires the operator to tell both the receiver and the sender the name of the file. Third, it only transfers one file at a time. Fourth, its checksum-based error-detection scheme is too simple in the eyes of some people. These four weaknesses led to the development of today's protocols.

For the rest of this, I'll talk about that first characteristic, block size. It's

the really big difference in the newer protocols—the transfer block size. That's the big story—and the secret to increasing the speed of your file transfers by as much as 300 percent.

Recall how XMODEM works. The sender sends the first 128 bytes of the file, then waits while the receiver determines whether or not the 128-byte block has transferred without transmission errors, using a simple checksum. Once the receiver has acknowledged the receipt of the first block, the sender sends the next 128 bytes, and so on.

The key to understanding why this is really inefficient (for most applications) is in knowing that the process of the receiver's checking the checksum and sending the acknowledgment to the sender may take more time than is required to send the entire block in the first place.

To see this, imagine this exaggerated scenario. You're communicating at 9600 bps with a BBS. This is 960 bytes per second, so each XMODEM 128-byte block takes about .13 second. Suppose it took 1 second for each acknowledgment to be computed and sent. That would mean that the sender would be spending .13 second sending, then 1 second waiting, then .13 second sending, then 1 second waiting, and so on. You would only be transmitting the file 11 percent of the time. While the average situation isn't that bad, it's close. For example, many communications programs save each block to disk as it's being received, so changing the block size from 128 to 1024 would reduce the number of disk accesses by a factor of 8.

Today's protocols allow for blocks ranging in size from 128 bytes to 1024 bytes. YMODEM, ZMODEM, and the CompuServe Quick "B" protocol are three popular examples. Your communications software probably allows you to set your block size, but the interesting question is, What is it already set to? I use Crosstalk for Windows extensively, and I like it a lot, but I'd used it for about a month before I realized that it set all protocol block sizes to 128 bytes by default. To see just how important block sizes are, I transferred several large files from CompuServe using block sizes of 128 and 1024. The 128-byte block size averaged a throughput of 362 bytes per second; the 1024-byte block averaged 987 bytes per second. A stunning difference that didn't cost me a cent—but it sure saves me money in CompuServe charges.

Now, there's a caveat to understand about setting your block sizes large. If you have a noisy line and your protocol discovers that a 128-byte block has been garbled, the sender need only resend 128 bytes. But when lines are noisy and you're using 1024-byte blocks, every block with even a single bad bit in it requires that you resend 1024 bytes. So the rule in picking block sizes is this: The cleaner the line, the larger the block size. Experiment to find the best

block size, and don't just accept the default block size. You'll probably find that local calls are more noise-free than long-distance calls—optical fiber lines notwithstanding.

Mark Minasi

Hardware Clinic

Timing and Performance

A related performance tip has to do with timing. After the sender has sent the block of data, it will wait a specified amount of time for the ACK that means "I got the data OK; send me the next block" or the NAK that means "I didn't quite get that; please resend it." But the receiver can't acknowledge what it didn't get, so in case there's been a line hit that obliterates an entire block, the sender will only wait a certain amount of time for the receiver's response. If it doesn't get it, the sender assumes that the data was lost, and resends. The question of how long it waits is where timing comes in.

Crosstalk for Windows, for example, allows you to set protocol timings to sloppy (wait a long time for acknowledgments), loose, normal, and tight. As before, a clean line can handle more strenuous timing than a noisy line, so finding your best settings will require some experimentation. I found that the best throughput I could achieve with sloppy timing was 894 bytes per second, but I got a throughput of 974 with tight timing. In both cases, I was doing 1024-byte block size transfers with a 9600-bps modem. That's nine percent knocked off my CompuServe bill.

Mark Minasi

Hardware Clinic

Error-Correcting Modems

There are programs running in your computer and the sender's computer that support the file-transfer protocol. It takes two to tango, so you've got to have both sides supporting the same protocol. But some modem manufacturers have taken a different tack. They've built a file-transfer protocol into the modems. To see why, let's look at a non-PC application of data communications.

Once, I was doing some consulting for a doctor. I noticed that he had a printer and a modem sitting all by themselves off in the corner. I asked what the printer did.

"That sends us the results of our lab tests," he replied. "We used to have to wait for results in the mail, or we'd have to pester the lab on the phone.

Now, the printer just comes to life a few times a day, and their computer uses our printer to deliver the lab test reports."

Nifty, I thought. The lab sold him a normal Okidata dot-matrix printer with a serial interface and a modem—a regular old PC-type smart modem. But a problem occurred to me—what about line noise? I'd hate to get a report that said, "CANCER DIAGNOSIS: P^%SKD##{."

Looking closely at the modem, I noticed that it had a label that said, "MNP Level 5/Error Free." The testing company uses modems with built-in file-transfer protocols. Such modems use protocols with small blocks, usually under 32 bytes in size. One way to tell if you're working with an error-correcting modem is to see if the text appears on your screen in spurts. The modems are examining the data in small groups, so, after acknowledging that the data is error-free, the data is released to the PC, which puts it up on the screen.

If you have an MNP modem or one that supports V.42 or V.42 bis, you've got an error-correcting modem. MNP stands for Microcom Networking Protocol, and it's an error-detecting and -correcting standard developed by Microcom. V.42 is the name of a modem standard promulgated by the CCITT (Consultative Committee on International Telephones and Telegraphs, a committee of a commission of the United Nations). All the V. standards refer to modems. V.22 bis is the standard that most 2400-bps modems are built around, V.32 is a very popular 9600-bps standard, and V.24 is the standard that describes the serial ports on your PC.

It seems that if the modems do the hard work of file transferring, that can't be a bad thing. In fact, it's valuable in many cases, but the vast majority of phone lines (in the U.S., anyway) are fairly clear. And, of course, there's a price to pay—it takes time for the modems to do the error checking, and that's time that they're not transferring data. My experience is that the extra overhead of the modem error checking usually doesn't pay off.

Consider disabling error checking (it's sometimes called ARQ) if your modem has this built in. You can generally turn it off either with a DIP switch or by altering your modem's setup string to include the three characters &M0. Again, my experimentation showed a best-case transfer of 974 bytes per second when error checking was disabled versus 894 bytes per second when it was left on.

Mark Minasi
Hardware Clinic

If You Have a Noisy Line

What about when you do have noisy lines? Should you disable error checking

and set your protocol block size small, or should you let the modems handle the error checking and use the maximum protocol block size? Definitely the latter, for two reasons. First, modem protocols have less overhead than most PC file-transfer protocols. Second, my unscientific tests with noisy phone lines have shown that modem protocols recover from noise much better than PC file-transfer protocols do. Given the choice, let the modem do it.

Mark Minasi
Hardware Clinic

Advantages of New Protocols

Modern protocols solve four problems presented by older methods.

- The older protocols use block sizes that are too small.
- They require the operator to start them up on both the sending and receiving side.
- They can only transfer one file at a time.
- They use error detection methods that are too crude.

Taking the last problem first, we saw that a checksum is calculated for every block of data sent via XMODEM. The receiver then uses that checksum to ensure that the data in the block was transmitted without damage from phone noise. The checksum's a good tool, but it has a problem in that there are some cases where line noise could change two bits in a 128-byte message, yet the noise wouldn't be detected by the checksum procedure on the receiver side. While such a thing is unlikely, it's still too likely for my taste—and probably too likely for yours, especially if your bank were to use XMODEM to transfer account information over phone lines every day! The checksum is only 99 percent effective—that is, it only detects line noise in 99 percent of the cases where it occurs. Most modern protocols don't use checksum, but instead employ a more complex mathematical function called a Cyclical Redundancy Check, or CRC, which is 99.9926 percent effective.

Batch processing would be preferable to user supervised uploading and downloading. It would be nice to use a wildcard character when transferring data. With XMODEM, you have to specify each file, one by one. YMODEM Batch and ZMODEM are among the newer protocols that offer batch transfer. I particularly like ZMODEM—it lets me specify a list of files, then says, "hang up after transfer?" I then walk away for a while, return, and I find that ZMODEM has transferred all of the files for me.

Perhaps even more amazing, if ZMODEM detects that one of the files was only partially transferred, perhaps because I was disconnected in mid-transfer during my last transfer session, ZMODEM will actually pick up where it previously left off. Late at night, when phone charges are at their lowest, I can queue up several megabytes for transfer, and go off to bed without worrying about staying connected all night—and receiving a ridiculously high phone bill. YMODEM and later protocols transfer not only the file, but also the file's name. All you need do is to just tell your communications software to receive file, and it gets the file name from the sending BBS.

Recall that modems equipped with MNP or V.42 capability not only transfer data but also check that it's transmitted with error correction. Newer modems may have MNP level 5 or V.42 bis, systems that not only perform error correction, but also do data compression. There are many data compression techniques in use these days; the most popular are the ones used by the PKZIP, ARC, PAK, and LHARC programs. If you've ever pulled a file off a computer bulletin board system (BBS), it probably had a ZIP, ARC, PAK, or LZH extension, requiring that you have on hand the appropriate uncompressing program.

The idea with file compression programs is simple—the more file time required to do a file transfer, the more the transfer costs, whether it's due to CompuServe charges, long distance charges, or whatever. File compression programs can often compress files to a tenth of their original size, and so a 1 megabyte file would compress to a 100K file. After transferring the 100K file, you then uncompress it on your local hard disk. It's a bit of a pain to go through the compress-transfer-uncompress cycle, however.

That's why many of today's modems include the ability to compress and uncompress data on the fly. With such a system, you'd never have to bother with the whole compression and decompression process; you'd just leave bloated, uncompressed files on your BBS, and let the modems handle the compression. Two terms stand out in the error correction area, MNP, for Microcom Networking Protocol, and V.42, an international standard. Both standards have been augmented to include data compression in addition to error correction. MNP's Level 5 includes data compression, as does V.42 bis. Now many modems come with these features.

If you're one of the many people who download images from bulletin boards, you've probably heard of GIF (for Graphic Interchange Format). GIF has become the image format of choice for the tons of bulletin boards that offer digitized images of astronomical objects, wildlife, technology, and so on. (Other image file formats you may have heard of are PICT, TIFF, PCX, or

BMP.) GIF files don't benefit from modem compression, because GIF is already a compressed format. To see this, try using PKZIP, LHARC, or whatever compression program you have on some GIF files—there will be very little or no compression. By the way, while generic compression routines can't reduce the size of GIF files, HandMade Software has a little shareware gem called JPG2GIF that will compress GIF files into its own proprietary format the company calls JPG. HandMade Software is at 15951 Los Gatos Boulevard, Suite 7, Los Gatos, California 95032. They ask \$20 for the program.

Since ZIP files are already compressed, and GIF files are in a format that doesn't lend itself to compression with normal compression techniques, it should be obvious that modems with built-in compression capabilities are of very little value to most of us. Not only are they of little value, they're often downright undesirable, as modems with built-in compression waste time trying to compress uncompressible data, slowing down file transfers. Given that ZIPs and GIFs are what most of us are downloading, look for a modem with the ability to turn off compression.

Mark Minasi
Hardware Clinic

Improving Modem and Serial Port Technology

An inexpensive chip has been around for years that can increase the speed of your file transfers. Called the 16550, it's a member of the class of chips called UARTs. UART is short for Universal Asynchronous Receiver/Transmitter. UARTs are the heart of any serial port. If you're curious, pop the top on your PC and pull out the board that has your serial port on it. (Some computers may have the serial port electronics right on the computer's motherboard, so this may not be possible without some effort.) You'll probably see a large 40-pin chip on the board. Look for the numbers 8250, 16450, or 16550. They may be wrapped up in some other numbers, such as INS8250AP or the like.

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Telecommunications and Multitasking

The 8250 was the original UART used in PCs and XT's. It was fine for communications up to 2400 bps, but it couldn't keep up with faster computers and communications. So the 16450 was developed, and it's fairly prominent on the

serial ports of computers in the 286 and better class. A complete internal redesign makes it up to ten times faster than the 8250 for some applications. Part of that speed comes from a one-byte buffer that makes life easier for multitasking systems. Multitaskers like buffers because serial devices need nearly constant attention or data gets lost. Buffers hold the data for a few extra milliseconds, making the process of juggling tasks a bit simpler. OS/2, in fact, insists on 16450 UARTs, and serial ports with 8250's aren't recognized at all. Fortunately, however, the 8250 and the 16450 are pin-compatible, so I've been able to convert a number of old parallel/serial cards to OS/2 compatibility by just swapping a single chip. The task is further simplified by the happy fact that many UARTs are socketed, removing the need for soldering.

OS/2 works well with the 16450 because it only has to deal with nice, well-behaved programs that were designed to be multitasked. Unfortunately, DOS multitaskers such as DESQview and Windows don't have that luxury. It can take so much time to swap around multiple DOS applications that background communications can be a real pain under most DOS multitaskers; in fact, I use background file transfers as one of my basic tests of DOS multitaskers. There's where the 16550 comes in. The next member of the UART family, it includes a 16-byte buffer, and that turns out to be just perfect for communicating with DOS multitaskers. It even smooths out file transfers at 9600 bps or greater for slow PCs. And, because it's pin compatible with its older siblings the 8250 and the 16450, you might find that you can upgrade easily. (I say might because you'll need your current UARTs to be socketed to do the upgrade.) And you'll need just one more thing: a program to turn on the 16550. Some do that automatically, but just to be sure, you can grab a program called 16550 off CompuServe.

But all isn't good news here. You'd think that a multitasking platform such as Windows would benefit from the 16550, and would use it if present. To the contrary, Windows will likely lock up if your 16550 buffers are enabled. The Windows COMM.DRV and virtual driver *combuff must be rewritten in order to use the 16550; Microsoft says it will take care of this "in a future release of Windows."

Mark Minasi

Hardware Clinic

Maximizing Your 9600

Suppose you have a fast computer and a 9600 bps modem. How do you squeeze the maximum file transfer rate out of your system? First and foremost, choose a protocol that allows large block sizes, as that will net the great-

est transfer rate. Make sure only one part of the system handles error checking, either the modem or the protocol. That means diving into your modem manual to find the code to turn error checking off, or it means leaving the modem alone and finding and using a protocol that won't try to do error checking. The preferred protocol here from my experience is YMODEM-G, if you can find a BBS or online service that supports it. The G is the important part; regular old YMODEM does error checking. Given the choice, let the modem do the error checking. It's faster, more robust in the case of noisy lines, and more thorough in its discovery of transmission errors. The main problem you'll find, as I just hinted, is finding a host that supports YMODEM-G.

Install a 16550 if you can, or think about replacing your current parallel/serial board with one that sports the newer chips. Understand, you'll not see a difference with a 16550 unless you're multitasking, transferring data at 9600 bps (or faster), or both. And whenever possible, use COM2 rather than COM1. Why? You'll get a slightly better response from COM2 because it's driven off interrupt 3 (so is COM4, so you could alternatively use COM4), where COM1 and COM3 are driven by interrupt 4. The interrupts in the PC are prioritized, meaning the items with the lower interrupts get higher priority. Assuming your PC is monitoring both COM1 and COM2—say, if you had a serial mouse on one COM port and a modem on the other—you'd do better to put the mouse on COM1 and the modem on COM2.

By the way, if you're using Windows, that's the preferred arrangement anyway, as Windows deals best with communications ports when it sees them in order. It sees the mouse first, so put that on COM1, and then it sees the modem on COM2 whenever you get around to starting up the communications application.

Mark Minasi

Hardware Clinic

Long-Distance Delegation

For the mobile manager, keeping in touch with subordinates can be perplexing. For Terry Kalil, public relations manager for Great Plains Software, who spends about 40 percent of her time on the road, it's a fact of life.

How does a manager go about managing workers she rarely even sees?

"In the past year I've gone from [being the] sole person to heading a staff of three. It has presented incredible challenges," says Kalil.

Because of her frequent absences, her staff has matured quickly. "In many ways I think my team is a stronger team because I am not here. They are learning to make day-to-day decisions," she says. "There is a great joy in

COMPUTE Magazine's Power Tips

finding [that] projects get done."

Yet there are special challenges for the mobile manager who manages from different time zones.

"Anytime you are developing a team, the challenge is to be a teacher via long distance," she says. "It is critical that when I'm in town I spend a lot of time laying out assignments, managing their current work, and providing feedback. One of the things we're implementing is a detailed planning-within-plan process." This means that every task is broken down into a set of steps and procedures, as on a flow chart.

However, she warns other managers that disaster can occur if a manager doesn't set boundaries for authority and decision making by workers.

"You need to set policies that empower employees to make decisions within a range that's appropriate [for] their experience," she says. "When you are gone a lot, they need that authority."

She advises managers to make sure that everyone understands the steps to complete the project. "I'm very big on having systems. They are critical to getting things done. They are important to remove redundancy." She's in the process of creating a training and procedures manual for her staff that will include such topics as how to update the database and how to write a press release.

Kalil shares these rules for mobile managers:

- Decide who will make decisions on which subjects.
- Create clear ground rules.
- Set clear limits of authority.
- Encourage communication with your team. Ask them to leave voice mail. Let them come to you. Call them back as soon as possible. Leave a detailed itinerary so they can get in touch.
- Give your people space and independence.

It's important for managers to communicate clearly the purpose of their field trips. "Always tell people...what you got out of [a trip]. If all you talk about is this great party or that great dinner, it creates the wrong impression in people's minds," she says. "If you tell people about the great concert or Broadway play, be sure to tell them about getting stood up for an appointment or delays at the airport. You must be sensitive to what war stories you tell."

Not only does she have to stay in touch with her staff, but she must also report to her managers. She says this is not a problem because the corporate

culture accepts the telephone, with its special strengths and weaknesses, as a fact of life.

"A lot depends on corporate culture. The company must be flexible and informal. People are top priority, instead of how many documents [are] processed," she says. Because of this philosophy, her own performance review was conducted via voice mail with her manager. "It was not uncomfortable because our communication skills have adapted. It feels like we are talking face to face."

One important dimension of using technology to manage employees is discipline. "Discipline means you check your E-mail and voice mail on a daily—or hourly—basis to stay connected to your employees in a timely manner," she says. "In a nutshell, it means not letting the technology replace the human elements of communication that are the keys to successfully using technology as a management tool."

Kalil's system for combining people, technology, and travel seems to have worked. The amount of media coverage received by the company has doubled in the past year, as has the number of leads generated by publicity.

Daniel S. Janal

Personal Productivity

Is a LAN in Your Future?

A computer network for the home office can serve the same purpose as one in the corporate office: It links PCs for easy file transfer and communication, and makes it possible to share a printer among several systems. Your home computer network can save you time—and money, too—just as a downtown business's computer connections make it a more productive workplace.

And though the word network may conjure up images of cables snaking underfoot, it can be no more difficult to create, install, and run a home office net than it is to connect a printer, plug in a cable, or dial the phone.

Office-bound networks serve four basic functions.

- Sharing files between or among computers
- Printing to a central printer from any machine
- Running applications from a central system
- Passing along electronic mail

The first three make sense in a home network, but the last, E-mail, may seem ridiculous unless your office is spread throughout a very large house.

But E-mail makes sense if there are more than two employees in your office, whether it's located in a house or an office building. It allows for paperless memos, messages for coworkers who are away temporarily, and an alternate route for the friendly give-and-take that makes an office cohesive and fun.

Depending on how much money and effort you want to put into your home computer network, you can go for full service—file sharing, printer sharing, and software pooling—or simply share files and perhaps a peripheral or two.

Gregg Keizer
HomeLAN

Small Network Options

The simplest and least expensive network is one that simply moves files from one computer to another via existing phone lines.

One file-transfer network takes advantage of your local phone company and LapLink Pro (Traveling Software, 18702 North Creek Parkway, Bothell, Washington 98011; 800-343-8080), a state-of-the-art file-transfer package for the PC. It may not be a network per se, but in a two-computer, two-phone line household, the combination gets you the same results.

LapLink Pro makes it easy to transfer files over a serial cable, but Traveling Software also sells connectors that allow you to string simple four-connector phone line between serial ports. A company spokesman said that he had successfully sent messages over 150 feet of serial cable, but if you are using unshielded phone line or live in an area with lots of radio emissions (from computers, CBs, and even garage door openers), you will need to keep the distances shorter than this or risk data corruption.

LapLink Pro's batch file transfer, clear progress gauges, and split screen—familiar to users of the earlier laptop-to-desktop LapLink software—make it a snap to use. Of course, with the program running, the source PC can't be used for anything else, but if your network needs are limited to moving files, it's a workable, bargain-basement remedy.

Gregg Keizer
HomeLAN

Mixing Platforms on a LAN

If you're connecting Macintoshes and PCs at home, you're only able to share files and printers. Since Macintoshes and PCs use different microprocessors

and different operating systems, you can't run Mac applications on the PC.

Apple's own LocalTalk network, with capabilities built into the most recent Macintosh operating system software, System 7.0, lets you link to PCs. Like the LapLink Pro connection, the simplest Mac-to-DOS LocalTalk network relies on the standard telephone lines in your house or office.

You'll need a PhoneNet Card PC (Farallon Computing, 2000 Powell Street, Suite 600, Emeryville, California 94608; 510-596-9000) for your PC, one of the company's PhoneNet connectors for the Macintosh, and a phone outlet near each computer. Farallon's PhoneNet is completely compatible with Apple's own LocalTalk, but it sends the bits and bytes across the two unused wires found in most home phone lines (if your phone line doesn't have them, you can install separate phone wire and jacks yourself or have a phone company installer do it). By relying on existing cabling, PhoneNet can save you a considerable amount of money, particularly if your computers are at some distance from one another.

The PhoneNet Card PC only works with PCs that operate at 25 MHz or slower, but for those computers, it's a terrific way to share files with Macs or to use a laser printer with two different systems. In effect, the PhoneNet Card PC and its accompanying software turn the PC into just another workstation on the LocalTalk network. You can share files and transfer them from Mac to PC, PC to PC, or PC to Mac, as well as print to a PostScript printer connected to the net.

If your PCs are using DOS 5.0, you can move all but 2K of the 134K required for the PhoneNet memory-resident software into high memory, out of the way of your applications.

Of all the true network alternatives, PhoneNet is the quickest way to get your Macintoshes and PCs talking.

Gregg Keizer
HomeLAN

Inexpensive Networks

You might think full-fledged networks are prohibitively expensive. If your image is of tens of computers, yards of cable, and pricey network software, then you're probably right. In a home office, though, you can get by inexpensively, even if you need a full-blown network that's capable of moving files, sharing printers, and running applications from a central system.

PromiseLAN (MOSES Computers, 15466 Los Gatos Boulevard, Suite 201, Los Gatos, California 95032; 408-358-1550) is a good example. For \$199 (about

a third less if you buy it by mail), you get a starter kit that links two PCs in a full-service network. Included in the kit are the necessary network adapters, software, and telephone cabling.

PromiseLAN is a real network, in that you can transfer files between computers and run applications from one PC's hard drive on another machine. You do get what you pay for, though. PromiseLAN can only connect as many as five computers, and it transmits data at a slow 1.79 megabits per second (Mbps), while most office networks move data at the Ethernet standard of 10 Mbps. But in many home offices, where convenience and low cost are as important as a long features list, neither limitation matters.

Do you want to stretch your cash even farther? Then The \$25 Network (Information Modes, P.O. Drawer F, Denton, Texas 76202; 800-628-7992 or 817-898-1294) may be just the thing. This software and cable package really costs only \$25, and it connects as many as five systems with phone wire jacked into a serial port in each machine. Transmission speed is even slower than PromiseLAN's—only 115 kilobits per second (Kbps)—but certainly acceptable for printing and file copying (a 150K file moves from PC to PC in just over ten seconds, for instance). The \$25 Network lets you run programs on any of the networked PCs, but unless the programs are fairly small, the data-transfer speed makes this impractical.

Much faster and more complete in its features than either PromiseLAN or The \$25 Network, LANtastic (Artisoft, 691 East River Road, Tucson, Arizona 85704; 800-846-9726 or 602-293-6363) is a network that's inexpensive enough for the home office. Buy the LANtastic AE-2 Ethernet Starter Kit for \$699 (less by mail), and you get two AE-2 Ethernet adapter cards, a 25-foot length of coaxial cable, and the software to connect as many as 300 workstations.

Expandability is less important than the fact that the network runs at a full 10 Mbps, you get built-in electronic mail (in case you have an assistant), and you have access to all disk and printer resources on the network. This is called a peer-to-peer network—all the networked PCs act simultaneously as both servers and workstations.

The result is a lightning-fast network that can take advantage of a large hard disk on one system and a laser printer connected to another.

Gregg Keizer
HomeLAN

Wireless Network

But what if you don't want to drill holes through walls or floors, or even go to the trouble of laying cable? Though it may seem like science fiction, you can connect computers in the home office with a wireless network that sends its signals via radio waves.

The LAWN (Local Area Wireless Network; O'Neill Communications, 100 Thanet Circle, Princeton, New Jersey 08540; 609-497-6800) boxes cost \$398 each (the printer node needs a special adapter, so it costs \$489); connect to the serial port of each PC and printer on the network; and though not extraordinarily fast (19.2 Kbps), offer file transfer, E-mail, and printer sharing.

If you have computers scattered around the house, LAWN dramatically cuts the network-setup time. It easily transmits data through walls, even floors. It's rated as an FCC Class B device, which means that it won't interfere with other computers, televisions, or high-fidelity equipment in the house.

LAWN is expensive to install—a two-computer-one-printer network runs nearly \$1,300—but if you'd rather compute than lay cable, it's an excellent alternative for a 1990s home office.

Gregg Keizer
HomeLAN

Why Network?

The hardest part about installing a home computer network might be convincing yourself (or your family) that it makes sense. It does in many situations, and here's what you can do if you invest in a net:

- Store everything on a 386 or 486 equipped with a large hard drive; then run applications and call files over the network to cut costs and centralize backup.
- Make any employees of your home-based business as productive as you are on the PC.
- Justify more easily the cost of a printer, since it can be used with several computers.
- Mix Macs and PCs in the same house, and still keep them talking.
- Let your kids run programs from their own PCs—games, educational titles, applications for homework—without worrying about keeping track of disks.

Gregg Keizer
HomeLAN

Why Not Network?

Although setting up a home network might be an enjoyable project, particularly for someone who enjoys setting up stereos and stringing cable, there are many other practical ways to coordinate the use of a small number of personal computers, most of which are less expensive than installing a network.

- Newer Macintoshes can read and write 3-1/2-inch PC disks, so you can run a small office with Macs and PCs on sneakernet: Simply shuttle files back and forth on floppies, using the Mac as the translator. (Older Macs can be upgraded to read and write to PC disks.)
- Removable hard disks allow you to use sneakernet with huge files and whole suites of applications. If you don't want to spend that much, tape drives are becoming remarkably inexpensive and are very compact, allowing you to move multimegabytes from machine to machine for around \$250 plus the \$30 cost of a tape cartridge. The downside of networking with snekertape is that tape devices have a relatively slow data-transfer rate. They were designed for backing up document files, not moving applications around. Bernoulli drives would be another portable mass-storage option.
- Many programs have severe restrictions on network use. A true network won't let more than one machine have read-write access to a given document at one time (because one user could save the file and then another could save a different version of the same file, destroying the work of the first person). But many applications also have restrictions on their use when installed on a network. Check your application manual under the section on network use. More than likely, it will tell you that only one person can use the application at a time. You'll often find that software can't be used on a network unless you purchase a special version or a special utility that makes it network compatible. This kind of software often makes a statement in the user's agreement that using it on a network without a site license is illegal—and site licenses can be expensive.
- Because of the costs involved, a full-featured network doesn't begin to pay for itself in dollars or in convenience unless you have four or five nodes operating. The lesson here is that starting a two- or three-node network using most network options makes sense if you have plans to expand in the near future, but it would be prohibitively expensive if that's as far as you intend to go.
- For printer sharing, a simple A/B switch box will serve as well as a net-

work and cost far less. Even sneakernet works pretty well for printer sharing. For print jobs that will generate printer files smaller than the capacity of a floppy disk, I direct the printer output to disk, transfer the disk to the computer connected to the printer, and use the command `COPY A:PRINT.FIL PRN` to send the file to the printer.

Robert Bixby
HomeLAN

Chapter 6

Streamlining Windows

Love it or hate it, Windows is shaping up to be the predominant PC graphical user interface. And if you're going to use it, you ought to use it well. Here is a collection of tips and ideas for using Windows more effectively.

In this chapter you'll learn

- How to work more effectively with Windows
- How to save time and RAM
- How to set up Windows to look the way you want it to look
- Why you shouldn't use a RAM disk for your temp files
- How to get started programming in Windows
- How to write macros with the recorder that don't rely on objects being in the same location at all times

The Way Things Are

When Windows 3.0 hit the streets two years ago, it entered a hostile world. OS/2 loomed on the horizon like a dragon ready to devour us, and MS-DOS, stuck in version 4.0, had lost its momentum. It looked as if Digital Research with DR DOS was the only company really trying to make DOS better. Computing was boring, and the masses were grumbling. Some people even started talking about UNIX.

After two years of Windows 3.0, things are very different. OS/2 is on its way to becoming a footnote in computer history. Microsoft has just released a dramatic upgrade to Windows 3.0, version 3.1, which will further cement Windows as the operating environment of choice. And the company has produced an excellent new version of DOS, version 5.0, that fits Windows like a glove. Today, there are hundreds of exciting Windows applications, doing things most of us only dreamed about two years ago. The masses are happy, and no one talks about UNIX much anymore.

Why has Windows been so successful? There are four main reasons.

First, there's the quality of the program itself. Windows is well designed, attractive, easy to use, flexible, and powerful. And it comes with an excellent group of support programs including Write, Paintbrush, Cardfile, Calendar, and Recorder.

The second thing that's really fueled Windows' takeoff is the fact that it runs DOS apps so well. In 386-enhanced mode, you can multitask DOS applications and customize the way they run. Microsoft recognized that downward compatibility with DOS was essential, and 3.0 garners four stars for getting along with DOS so well.

For those of us who use DOS apps regularly (and I imagine that includes most Windows users), 3.1 is a boon. Not only does it let you select your own DOS icons (which appear on your desktop when you minimize the DOS apps), but windowed DOS apps now support the mouse. Windows 3.1 earns five stars for getting along with DOS.

The third element is 386 hardware. Windows' magic act with DOS apps only plays on computers powered by an 80386 or better CPU. When Windows 3.0 was released, 386s had just become an option for most of us. A full-boat system was still about \$3,000, but that was within reach—a figure most serious PC users and most companies could handle.

Now, 386 prices have dropped dramatically, and loaded systems sell for about half of what they did at Windows' debut. And the 486 is fast becoming the de facto standard.

The fourth major factor in Windows' success (and perhaps the most important in the long run) is that a large number of Windows applications were immediately available after 3.0's release. In the past two years, developers have fallen over each other creating Windows applications and have made this by far the most active area in applications development today.

There's no doubt about Windows' success, but the question is, Should you switch to Windows?

In most cases the answer is yes. And the reason is simple. The most exciting apps being released today are Windows programs. And Windows pro-

grams are usually much more powerful than their DOS counterparts. But the icing on the cake is, as I mentioned earlier, that you can stay at the leading edge with Windows programs, but you don't have to give up your DOS favorites.

For example, DOS XyWrite is still one of my favorite word processors, and I'm writing this column with XyWrite now. If I have to print something that needs to look spiffy, however, I use Word for Windows. And if the document is complicated, I use PageMaker for Windows.

Clifton Karnes

Editorial License

Windows Apps: Before and After

Not long ago each PC program came in a single COM file, less than 64K in size. You didn't really install a program in those days—you just copied it to a floppy disk and ran it.

The next level in size escalation came when programs started to require overlays, which allowed parts of a program to be shuttled in and out of memory as needed. And as programs became more complicated, additional support files for printing and various other things were added. To install these programs that occupied several files, you simply copied all the files on the distribution disks to your hard drive.

Things are not so simple in Windows-land. Windows apps can use scores of files, and the installation programs are notoriously sloppy about distributing these files all over your hard disk as well as making changes to your `config.sys`, `autoexec.bat`, `win.ini`, `system.ini`, or all four.

Typically, a program will deposit its main files in a special subdirectory (or group of subdirectories) it creates on your hard disk, and it will add an INI file to your Windows subdirectory. It may also add a file or two to your `SYSTEM` subdirectory. And it will probably alter your `autoexec.bat` (to include itself on your already bulging path), perhaps add a driver or two to your `system.ini` or `config.sys` files, and almost certainly make some entries to your `win.ini` file.

There's really no problem with all of this until you want to get rid of one of these programs. Where are all the files? And what changes were made to your system files that you need to undo?

Because Windows programs tend to install files in so many subdirectories and alter so many files, each program should have its own uninstall option. These are rare, however.

Here's a solution. With the two batch files listed below, called Before and

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After, you can create a list of changes a program makes when it installs itself.

The principle is simple. Run Before before you install any software. It makes a list of every file on your hard disk. To this list it appends the contents of your config.sys, autoexec.bat, win.ini, and system.ini files.

Next you install your software, and after you've finished, you run After. The first thing After does is make a list of all the files on your system and the contents of your system files, just like Before has done. But this list includes the files added by the program you've just installed as well as any changes made to your system files. Next, After compares the list it's just made with Before's list. Any files added or deleted from your system show up in the comparison, as well as any changes to your system files.

Here's the listing for before.bat:

```
@echo off
cls
c:
cd \windows
echo [BEFORE] Recording files on disk (this will take a while)...
chkdsk/v >c:snapshot.tmp
echo [BEFORE] Checking system files...
copy c:snapshot.tmp + c:\autoexec.bat + c:\config.sys + c:\windows\win.ini+
c:\windows\system.ini c:before.txt >nul
echo [BEFORE] Cleaning up...
erase c:snapshot.tmp
cd \
```

The CHKDSK command with the V switch isn't used very often, but it's great for us. It causes CHKDSK to list every file on the disk with its complete path. We redirect its output to snapshot.tmp. The next step is to append the system files to snapshot.tmp and store the complete list in a new file, before.txt. Now we have a snapshot of our system before we install a new program.

Here's the listing for after.bat:

```
@echo off
if "%1" == "" goto end
cls
c:
cd \windows
```

```

echo [AFTER] Recording files on disk (this will take a while)...
chkdsk/v >c:snapshot.tmp
echo [AFTER] Checking system files...
copy c:snapshot.tmp + c:\autoexec.bat + c:\config.sys + c:\windows\win.ini
    + c:\windows\system.ini c:after.txt >nul
erase c:snapshot.tmp
echo [AFTER] Checking for changes...
fc c:before.txt c:after.txt >c:%1
type %1 | more
goto stop
:end
echo Please specify a filename for the changes.
:stop

```

When you run After, you'll need to specify a filename for a file where the program can document the changes it finds.

The first few lines of After do just what Before does—they make a snapshot of your system.

The line

```
fc c:before.txt c:after.txt >c:%1
```

compares the two snapshots and puts the results in the file you specified on the command line.

You can then use the file created by After to locate the files introduced and altered by the installation.

Clifton Karnes

Point & Click

Programming 3.1

There's a lot for programmers to get excited about with Windows 3.1. First, real mode is gone. While real mode provided a transition from Windows 2.0 to 3.0, it's always been a pain for programmers.

Although this version of Windows unassumingly carries a "point one" designation, in terms of new API (Application Program Interface) calls, it represents the biggest improvement in Windows history. Version 3.0 boasted 578 API functions, but 3.1 lists nearly 800 (the enhanced versions of Windows for multimedia and pens list nearly 1000 calls each).

Included in this large API group is a call for a standard File Open dialog box. The new dialog box includes a directory list of files and a tree display, as well as drop-down list boxes for drives and file extension types.

The most challenging new feature for programmers is OLE (Object Linking and Embedding). With OLE, users can embed data in both the client's and the server's native formats. There are nearly 70 new API calls for OLE.

Clifton Karnes

Windows 3.1

What's New in Windows 3.1

Windows 3.1 is here and it's hot. It's faster, crashes less often, has a topnotch File Manager, runs DOS programs better than 3.0, comes with its own font technology (TrueType), makes compound documents possible with OLE, and much, much more. In short, it addresses almost every criticism of 3.0 and goes far beyond with new and exciting innovations.

Clifton Karnes

Windows 3.1

More Than an Incremental Upgrade

Don't be misled by the 3.1 version number. This release was originally conceived as a minor upgrade to 3.0, but in the past year, it's grown into what should really be called Windows 4.0.

The changes begin with Setup. It's enhanced and has a special Express option that's faster and well worth using. If 3.1's Setup detects another version of Windows installed on your system, it will update it, leaving your groups and configuration as they are.

I'd like to take a quick look at the ways in which the Windows environment has been improved.

First, resources should no longer be a problem for anyone. The new Windows provides much more memory for resources, and most people will never run low.

There's also a local reboot option, which allows you to reboot a single Windows or DOS application without rebooting your whole system. To use this feature, you simply hit Ctrl-Alt-Del, and you'll see a screen that offers you the option of pressing Enter to kill the current app, pressing Ctrl-Alt-Del again to reboot your system, or pressing Esc to return to Windows. This one's a lifesaver.

If you're tired of fiddling with the load= and run= lines of your WIN.INI,

you'll be glad to learn that there's a new group called Startup. All the apps you place in the group are automatically run when Windows boots. If you want to start up a program minimized, there's a new check box for that option in each program's properties box.

Drag and drop, mentioned above, is a slick timesaver.

Multimedia sound support is now built into Windows, so if you have a Sound Blaster, Ad Lib, or Roland card, you'll be able to take advantage of applications that use sound hardware. And with 3.1, you can map sounds to system events, so you could, for example, have a siren as your default beep.

Program Manager's Run command now has a browse option, so you can point and click through drives and directories to find the file you want to run.

There's a much-improved file list dialog that's now part of the Windows API. One of its nicest features is that you select from several file extensions (or supply your own) via a drop-down list box.

And last but not least, there's an attractive new startup screen that displays Windows 3.1's new logo. I've got to admit that one of the first things I did with 3.0 was to use the WIN : command so I could bypass the startup. But with 3.1, the startup's pretty cool, and I actually like to see it.

Clifton Karnes

Windows 3.1

More Windows Speed

After you've got Windows up and running, the first thing you'll notice is that it's faster—a lot faster. There are several reasons for 3.1's dramatic speed increase. First, the code has obviously been fine-tuned for speed optimization. More visible, though, are new video drivers—especially a Super VGA driver that's much faster than the third-party 16-color drivers I've seen.

And hidden in the system is Fast Disk, a 32-bit hard disk driver that revs up disks driven by Western Digital and compatible controllers.

To see if Fast Disk is installed on your system, check Control Panel, or look in the [386Enh] section of SYSTEM.INI for the lines

```
device=*int13
```

```
and
```

```
device=*wdctrl
```

These are the Fast Disk drivers.

Windows 3.1 also comes with enhanced versions of HIMEM.SYS, EMM386.EXE, and SMARTDRV.EXE. (Yes, you read that right. SMARTDrive 4.0 is now an EXE file.) The new SMARTDrive is both faster and smarter.

In addition to its increase in speed, 3.1 is much more robust than 3.0. You can all but kiss those UAEs (Unrecoverable Application Errors) goodbye. As an example, Windows used to crash on my system at work at least once or twice a day. Now crashes are extremely rare—especially with DOS programs, which used to be my biggest source of problems with 3.0.

Clifton Karnes

Windows 3.1

Fancy File Manager

An improved Setup, increase in speed, and more robust design are exciting, but they're not things you can touch and play with. The new File Manager is, and it's 3.1's hottest new application. In fact, the new File Manager alone is worth the upgrade price.

When you first run File Manager, you'll notice its new look. Each drive window sports a directory tree on its left side and a window displaying the files in the selected directory on the right.

You can open and display multiple drive trees and directories, so copying and moving files between disks is very easy. And since this version of File Manager is fully MDI (Multiple Document Interface) compliant, you can minimize drive displays at the bottom of the File Manager window.

Other enhancements let you select any font for File Manager's display, copy and format disks, and connect or disconnect from network drives.

And unlike 3.0's File Manager, this version is fast. The File Manager in 3.0 used to rescan a drive every time you switched. Since this version lets you open a new drive window without closing the current one (by Shift-double-clicking on the drive icon), rescanning isn't necessary. And scanning is faster, too. Even on a network with directories of more than 1000 files, WinFile 3.1 is pretty snappy.

An especially useful enhancement to File Manager is 3.1's drag-and-drop feature. Here's how it works.

Run Notepad and iconize it on your desktop. Now run File Manager and tile it so the Notepad icon is visible.

Click on a text file in File Manager, drag it to the Notepad icon, and release the mouse button. The file is loaded into Notepad. (And Notepad, by the

way, can now read almost any file of 64K or smaller, including binary files!)

Drag and drop works with most Windows accessories, and it will work with any third-party Windows programs that choose to support it.

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Windows 3.1

Better DOS Support

DOS programs get a real boost in the new Windows. Not only do they run faster, but 3.1 now intelligently manages icons for DOS programs. This means that if you specify an icon for a DOS app in Program Manager, that icon (rather than a generic DOS icon) will appear on the desktop when you minimize the program.

I've saved the best DOS news for last: Windows 3.1 comes with special mouse drivers that let you use your mouse in a windowed DOS app. Even as I write this, I hear the Hallelujah chorus in the background.

It's true that the mouse response isn't as fast as that of the text-based DOS mouse, but it's a great convenience, and one you probably won't want to live without.

One minor drawback of the DOS-box mouse support is that you now must choose Control Menu, Edit, Mark to select text to copy to the Clipboard instead of just clicking the mouse button to enter select mode the way you could in 3.0.

Clifton Karnes

Windows 3.1

Personalizing Windows

There are lots of supplemental icons to choose from in Program Manager's executable, PROGMAN.EXE, and in a new icon collection, MOREICONS.DLL.

In addition, the background and cursor colors in DOS windows are now better, and you can choose the font you want your DOS box to use.

Clifton Karnes

Windows 3.1

Object Linking and Embedding

OLE (Object Linking and Embedding) is a major enhancement to Windows that lets you create compound documents by embedding one application inside another. To get an idea of the power of OLE, let's go over the three ways

you can transfer data between Windows apps. In the discussion below, the client is the program that receives the data, and the server is the one that provides it.

The first way to transfer information is with the Clipboard. Using the Clipboard, the client gets a copy of the server's data in a form the client can use. There's no link between programs—this is the data-transfer equivalent of a one-night stand.

With DDE (Dynamic Data Exchange), the client gets the data in a form it can use, and it sets up a permanent link with the server, so if the data is changed, the client's information can be updated. With DDE, the client and server are going steady.

OLE is akin to DDE, but it goes a step beyond. With OLE, not only does the client get the data in a form it can use and set up a link with the server, but it gets a copy of the data in the server's native format, too. There's a real commitment here. This is data marriage.

If you're using OLE, you just double-click on the embedded spreadsheet figures in a word processing document, and your spreadsheet loads inside your word processor, so to speak, ready for editing.

Clifton Karnes

Windows 3.1

TrueType

In the past two years, TrueType has become the Jackie O of the computer press. It's an outline font technology, like PostScript, that was developed by Apple, licensed by Microsoft, and incorporated into Windows 3.1.

If you don't already have a collection of fonts, then TrueType is great news for you. With 3.1, you'll get a basic collection of 13 high-quality outline fonts. If you do already have a font manager, such as ATM or Facelift, and an investment in fonts, then you may never use TrueType.

If you've never used a font manager, you may ask, What good is one? Well, as people who've been using ATM or Facelift already know, a font manager gives you true, accurate WYSIWYG screen output, and outline fonts let you print almost any size text from each typeface. Windows 3.1 comes with Times (called Times New Roman) and Helvetica (called Ariel) as well as Courier and Symbol, all in normal, bold, italic, and bold italic styles.

TrueType is installed by default, but if you choose not to use it, you can turn it off (and save some memory). Open Control Panel and double-click on

Fonts. Click on the TrueType button and make sure Enable TrueType Fonts is not checked.

Clifton Karnes
Windows 3.1

SMARTDrive

It's true that SMARTDrive used to be the brunt of a lot of jokes, the punch line always playing on the fact that it really wasn't smart at all.

The SMARTDrive shipping with 3.1 is a different animal, however.

First, it's now an exe file, and you load it in your autoexec.bat.

Smartdrv will automatically load itself into high memory, unless you tell it not to (pretty smart). And now it caches writes, which gives it a big performance boost. If you're nervous about caching writes, you can turn this feature off or just cache writes on selected drives.

And you can now control SMARTDrive interactively, which means you can turn it on or off and adjust its parameters while it's running.

Most people will simply specify the same two parameters for smartdrv.exe that they did for smartdrv.sys. For example, if the line in your config.sys file says device=smartdrv.sys 1024 512, you translate that line to smartdrv.exe 1024 512 in your autoexec.bat. SMARTDrive will automatically configure itself to cache writes for optimum speed.

If you want to find out how SMARTDrive is doing, type *smartdrv /s* at the DOS prompt (in or out of Windows), and you'll get a status screen that tells you the number of cache hits and the number of cache misses. The higher the ratio of hits to misses, the better SMARTDrive is performing.

If you're a Stacker user, it's worth noting that this new version of SMARTDrive is Stacker-aware and works fine with stacked drives.

Clifton Karnes
Windows 3.1

Accessories

As if all this weren't enough, Windows 3.1 adds several new utilities and enhances others. Among the most useful new apps is Character Map, which displays a grid of all the characters available for each font in your system.

When you double-click on Character Map (found on the Accessories group), you'll see a character grid with your font names listed alphabetically in a drop-down list box.

Click on any character, and you'll get an enlarged view of it. There are

also buttons to copy the selected character to the Clipboard and to append groups of characters. Once in the Clipboard, you can paste the character or characters directly into your document.

There are several enhancements to Control Panel's Desktop utility. First, there's an animated screen blanker that offers full password protection. There are a limited number of animations available, but they're all usable.

In addition, Desktop now sports several new, well-designed wallpaper bitmaps. Be sure to check out Marble and Slash.

Last but not least, there's a new OLE utility that links icons to objects you insert in documents.

Clifton Karnes

Windows 3.1

Windows 3.1's Top Ten New Features

1. Speed. You'll find 3.1 is faster doing almost everything from loading programs to updating the screen. And not only are Windows programs faster, but DOS apps run faster, too.
2. Robustness. With 3.1, you'll have fewer crashes, and you'll be able to recover from many with 3.1's local reboot.
3. Better File Manager. Forget thirdparty products. The new WinFile is the best Windows File Manager around.
4. More system resources. With 3.0, no matter how much memory you had, system resources were a brick wall you continually bumped into. This problem has been all but eliminated with 3.1.
5. Drag and drop. Select a file in File Manager and drag it to Notepad, Print Manager, Write, or any appropriate app minimized on your desktop, and the file is automatically loaded in the application.
6. TrueType. Windows now sports its own font manager.
7. OLE. Windows 3.0 brought us DDE, which allows one application to talk to another in a client-server relationship. Now with 3.1, we have OLE (Object Linking and Embedding). With OLE, you can actually embed one application inside another.
8. Multimedia sound support. With 3.1, you get support for sound cards, including recording and playback.
9. DOS icons and mouse support for DOS windows. Minimize a DOS app, and the icon you've associated with it sticks to it. Window the app, and you can use your Windows mouse pointer.

10. **Faster SMARTDrive.** The new smartdrv.exe has a raft of new features to enhance performance, including the ability to cache writes.

Clifton Karnes

Windows 3.1

How OLE Works

OLE is one of Windows 3.1's more powerful new features. Here's a step-by-step tutorial on embedding a Paintbrush object in a Write document.

1. Run Paintbrush and load weave.bmp, the object we're going to embed.
2. Select the picture, and choose Edit, Copy.
3. Run Write, and select Edit, Paste.
4. The WEAVE picture will appear in your Write document. You've created an embedded object.
5. Close Paintbrush.
6. Now double-click on the WEAVE object, and Paintbrush will run with weave.bmp loaded.
7. To link an object, follow all the steps above, except number 3, and choose Edit, Paste Link.

Note that when you embed an object, you create a static copy of the object. If the original changes, your copy won't change. When you link an object, you create a dynamic copy of the object. When the original changes, so does the copy.

With the Packager application that comes with Windows 3.1, you can embed objects but display them as icons.

Clifton Karnes

Windows 3.1

Turbocharge File Manager

When you upgrade to Windows 3.1, you might want to start using the program's powerful new File Manager. It's a dramatic improvement over 3.0's File Manager, and here are two Recorder macro tips that will make it even more powerful. (These macros work with 3.0's File Manager, too, so don't stop reading if you don't have 3.1 yet.)

First, some background. With File Manager, there are two ways you can easily view files: You can associate the file's extension with Notepad (or another text-editing or -viewing program) and double-click on the filename. Or

you can drag the file to Notepad's icon minimized on the desktop (in Windows 3.1 only).

The first method works only if the file is associated. The second method requires that Notepad be minimized on your desktop, ready and waiting to receive the file.

But what do you do when you want to load a batch file into Notepad but BAT is the extension of an executable program and can't be associated? Or when you have small text files with doc extensions that you want to read in Notepad but doc is associated with WinWord? The answer is to create a Recorder macro to load the file at the cursor in File Manager into Notepad.

Before we dive into the File Manager macros, there's a possible problem with Recorder we need to remedy. If it records your mouse clicks, any mouse movements you make will only be played back correctly when the position and configuration of your windows are exactly the same as when the macro was recorded.

The solution is simple. Tell Recorder to record only your keystrokes. Here's what to do.

1. Select Options, Preferences.
2. In the Record Mouse drop-down list box, select Ignore Mouse.
3. Click on OK.

Now that the mouse business is fixed, let's get back to the macro that will load the file at the cursor into Notepad. Here are the steps.

1. In File Manager, select a file to load into Notepad.
2. Open Recorder, choose a name for your macro (such as Load File at Cursor into Notepad), and start recording.
3. In File Manager, press AltF, P, and Ctrl-Insert to copy the selected file-name to the Clipboard. Press Tab, Tab, Enter to exit the dialog box.
4. Press Alt-F, R. Then type *notepad.exe* followed by a space in the text box.
5. Press Shift-Insert to paste the name of the file into the text box.
6. Press Enter.

Stop recording, and assign the macro a keypress. I suggest Ctrl-Alt-N.

Now simply press Ctrl-Alt-N to load any file selected in File Manager into Notepad. (The Notepad in 3.1 can load binary as well as text files.)

Here's another common problem. If you want to view files by their extension type in File Manager, it's a cumbersome process. You have to go

through slow menus and dialog boxes.

The solution, again, is to create a Recorder macro to automatically display all files with the same extension as the file at the cursor.

Here's the macro, step by step:

1. Place the cursor on any filename in File Manager that has an extension.
2. Run Recorder (make sure you're ignoring mouse movements), and prepare to record a macro. I suggest a name such as View by Type and a key combination of Ctrl-Alt-T for this macro.
3. Press Alt-F, P. Then press the left-arrow key five times.
4. Press Shift-End to define the part of the filename before the extension.
5. Press Delete.
6. Type `"*"`.
7. Press Home, followed by Shift-End to define the wildcard filename.
8. Press Ctrl-Insert followed by Esc.
9. Press Alt-V, T (press C instead of T for Windows 3.0), and Shift-Insert to paste the wildcard into the text box.
10. Press Enter to display files with the wildcard.

The macro to display all filenames is quite simple:

1. Press Alt-V, T.
2. Type `"*.*`".
3. Press Enter.

A good name for this macro is View All, and the key combination I suggest is Ctrl-Alt-A.

From now on, Ctrl-Alt-N will load the selected file into Notepad, Ctrl-Alt-T will display files with the selected file's extension, and Ctrl-Alt-A will display all files.

You can find these 2 tips, plus 99 more, in my book *101 Essential Windows Tips*, published by COMPUTE Books.

Clifton Karnes
Windows 3.1

Easier Windows Programming

It's true that Windows C programming is more difficult than DOS C programming, but it's not that much more difficult, and nothing makes this point

more strongly than Microsoft's QuickC for Windows. You still have to learn the Windows API and message-based way of doing business, but with QuickC for Windows, intermediate to advanced DOS programmers can write real Windows apps.

QC/Win offers an almost ideal environment for program development. The editor is fully MDI compatible, which means that you can handle multiple files easily. There's also a toolbar that quickly becomes indispensable. It sports buttons for compiling, building, adding breakpoints, calling the watch window, tracing, and stepping.

The editing environment is the most customizable I've ever seen. It even puts some Windows-based word processors to shame. For starters, you can choose your default font. Included is the fixed system font, which is ideal for programming. Next you have a choice of colors for the background and foreground text. If you want a deep blue background with a white foreground, for example, it's easy to set up.

Perhaps the best feature of this color control, however, is that QC/Win lets you specify colors for just about everything. You can put C keywords in one color, comments in another, errors in another, and so on. This may not sound exciting at first, but careful use of this feature will make your programs much easier to create and edit.

Microsoft is famous for its online help, and the help with QC/Win is excellent. The entire Windows API is documented, and it's easier to use than a manual. The explanations of the functions are very good, but I'd like to see more examples.

QC/Win comes with several additional modules to aid program development. Included is a dialog editor, which allows you to draw a dialog box Visual Basic style; a bitmap editor, for creating and altering icons and other bitmaps; and QuickCASE:W, an excellent interface design tool and code generator.

Now, to create a program. Getting back to the Windows-programming-is-difficult issue, you've probably heard that even a "Hello, world" program takes hundreds of lines of code. Well, that's true, because creating a window involves a lot of overhead. But there are many useful programs that don't require that you create a window.

My first QC/Win program was one of these. It's a utility that I used every day for months. You probably know that most Windows applications start with a window size that seems chosen at random.

Since I like to run most of my applications maximized, I wrote a simple program that does just that. The code is just the following single line.


```
return WinExec(lpCmdLine,SW_SHOWMAXIMIZED);
```

The command line syntax for this program is `RUNMAX programname [parameters]`. It simply accepts the name of the program you want to run along with any parameters, executes the program with `WinExec`, and specifies `SW_SHOWMAXIMIZED`, which says to run the program maximized.

It's fast and useful, and it uses little more than one line of code. In addition to the main file, `QC/Win` requires that each program include a definition file and a make file. The definition file contains housekeeping info for `Windows`. For this program, both are short.

To create a make file with `QC/Win`, you simply use a browser to select the files your program uses. `Runmax` uses just two files: `runmax.c` and `runmax.def`.

The point is this: If you know some C and you're familiar with `Windows` as a user, you have the background to get started with `QC/Win`. You won't be creating a killer database right away, but you can write neat, useful applications almost right off the bat.

Clifton Karnes

Windows 3.1

Making Windows Easy on the Eyes

Some older users find `Windows` is hard on their eyes. If you have this problem, try two things. First, adjust the colors. Many people find gold letters against a light blue background soothing—try different color combinations.

You can also pick larger letters. In your `system.ini` file, you'll see three lines: `fixedfon.fon=`, `oemfonts.fon=`, and `fonts.fon=`. All are followed by the names of the font files. Back on your original `Windows` disks, you'll find the font files that are designed for the high-resolution 8514 adapter. They are, respectively, `8514FIX.FON`, `8514OEM.FON`, and `8514SYS.FON`. Copy those files to `\windows\system` and change the `system.ini` lines to `fixedfon.fon=8514fix.fon`, `oemfonts.fon=8514oem.fon`, and `fonts.fon=8514sys.fon`.

Restart `Windows`, and most of the text will be quite a bit larger, and easier on the eyes. (The third alternative is, of course, a 21-inch monitor, but at \$2,000 not too many of us can afford one for the home.)

Mark Minasi and Tony Roberts

Getting Started with Windows

Getting More Done in Windows

To get more done while Print Manager spools your files to the printer, select the Low Priority option in Print Manager's Options menu. This allocates more processor time to your task, but it does slow printer output a bit.

Mark Minasi and Tony Roberts

Getting Started with Windows

Default Card File

If you use Cardfile to keep a phone list or a contact list, chances are you use the same data file every day. Have that data file automatically loaded each time you launch Cardfile by including the name of the data file on the Cardfile command line. To do this, click once on Cardfile to select it, then from the File menu select Properties, and add the name of the data file (including the CRD extension) to the command line. Next time you double-click on Cardfile, your preferred data file will be opened for you.

Mark Minasi and Tony Roberts

Getting Started with Windows

Printing Your Windows Screen

A lot of folks still don't know that you can use the Print Screen key in Windows and capture the whole screen to a Paintbrush-compatible file. Alt-Print Screen only captures the active window. Both are useful for manuals or including screen shots in a memo.

Mark Minasi and Tony Roberts

Getting Started with Windows

Living with Disk Drives

If you're using a disk device driver with Windows, or you have a hotshot high-speed disk controller, Windows may freeze up on a 386. The fix is easy: in system.ini, look for the line [386enh]. Directly after it, type *virtualhdirq=false*. Next Windows startup will be painless.

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Getting Started with Windows

DOS and Windows

Make sure you've set your TMP and TEMP environment variables. When

Windows applications are out of memory space and need some space to create temporary files, they look for TEMP and TMP to show them where to create those files. My E: drive is fairly empty, so I set them there: set temp=e:\ and set tmp=e:\. If you don't have these statements in your autoexec.bat, the Windows programs won't create temporary files and may run out memory.

Mark Minasi and Tony Roberts
Getting Started with Windows

Don't Swap to a RAM Disk

Some people think that one way to make Windows really fast is to create a RAM disk, and then set tmp and temp to that directory. Think about it for a minute and you'll see why this won't work: RAM disks take RAM away from your system, RAM that Windows would use otherwise. If you didn't create the RAM disk in the first place, Windows would never have needed the temporary file space. So there's no point in creating RAM disks for use by Windows as a temporary swap space.

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Memory Problems

If you find yourself running out of memory, consider lowering the size of your SMARTDrive cache. The Windows installation program habitually sets the cache rather large—2MB for a system with a total of 4MB—often leading to a RAM squeeze. Take a look at your autoexec.bat and you'll see a line like smartdrv 2048 1024. The first number is the Smartdrive cache size in kilobytes—2048K, or two megabytes, in this case. Reduce that to 1024, and you'll still be dedicating a megabyte of RAM to your cache, and giving your Windows programs an extra megabyte of memory.

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DOS Shells and Windows

If you often run a DOS shell from Windows, you may find yourself making the mistake of running Windows again rather than exiting DOS back to Windows. To remind yourself where you are, run Windows from a batch file that uses the PROMPT command to give you a reminder that Windows is active. As long as you remember to launch Windows via this batch file, you won't

forget that Windows is active. This is what the batch file could look like:

```
@echo off
set oldprompt=%prompt%
prompt Windows active. Type EXIT to return.$_P$g
win
prompt %oldprompt%
set oldprompt=
```

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Running DOS in the Background

By default, the DOS prompt icon creates a separate full-screen session that you can run most DOS programs in. But when you jump back to Windows, the DOS session stops dead—whatever program was in that session is suspended until you jump back to it. You can fix that (in 386 enhanced mode only) this way: First, start the DOS session. Then click on its icon to bring up its control menu. Click on Settings and a dialog box will come up. There will be a check box called Background. Click on it, and an X will appear in the box. Now the DOS session will continue to run in the background.

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No CHKDSK /F

Never run CHKDSK/F from inside Windows: trust us on this one. It can end up damaging your File Allocation Table (FAT), which in turn can make files on your disk inaccessible.

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PATH and Windows

Many Windows programs do not have to reside on your PATH. So long as you fully specify the pathname of a Windows EXE file, Windows can run many of your applications whether or not they're on the path. This helps keep your PATH short. The Windows directory itself must be on your PATH.

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Speed Keys

Learn the speed keys. If you use a particular Windows application with any regularity, using the speed keys will let you be more productive. They're consistent, too: for example, most Windows programs can be exited with Alt-F, followed by X.

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Multitasking Windows

One of the best things about Windows is its smooth multitasking of Windows applications. There's nothing more convenient than being able to write a memo in one window while downloading files from CompuServe in another window. You can do that with a non-Windows communications program while in 386 enhanced mode, but don't: there are some good Windows communications programs out there (such as Crosstalk for Windows and Unicom), and they're a worthwhile investment.

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Quick Run Programs

You can quickly run a Windows program by pulling down the File menu in Program Manager and clicking on the Run menu entry. A dialog box will appear requesting a program name—just fill in the full pathname for the exe Windows file. This is a very convenient way to try out a new Windows program without having to load the File Manager, working your way through the subdirectory tree, and clicking on the exe file.

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Online Help

The online help that Windows applications provide is beneficial for new program users, but once an application is learned, the help files become dead weight on the disk. Go ahead and delete the HLP files for applications that you know well. If you try to access that help file later, no harm will be done, but you'll receive a message indicating that the files can't be found. Do not,

however, delete WIN.HLP and WINHLP.HLP. These files run Windows' help system—if they're gone, you won't be able to get help for any new applications you might add.

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Grouping Applications

When Windows starts up, it arranges your applications into application groups. I hate hunting around for applications, so I put them all into a single group I call desktop. The part most people don't know is how to move programs from one group to another, but it's simple. Just click and drag the program icon from one Program Manager application group window to the desired window.

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Getting Started with Windows

Tiling Windows

You can use the Tile command as a quick way to create a neat Windows desktop. The problem is that every time Tile is selected, program groups are shuffled unpredictably and you have to hunt to find your favorite icons.

To get program groups where you want them, first select Tile so you can see all the groups clearly. Next, click once on each program group in turn according to where you want it to fall in the tiling scheme. For example, if you want to tile three program groups, click first on the group that you want on the right of the screen, click second on the group that should appear in the middle, and click third on the group that should appear on the left.

Select Tile again and the windows will rearrange themselves as ordered. Be sure to check the Save Changes box when you quit Windows so your program groups will be positioned properly the next time you run Windows.

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Minimize File Manager

Once you open File Manager, don't close it down when you're finished using it. Instead, minimize File Manager to an icon. When you need File Manager

again, restore it from the icon. This saves several seconds because File Manager won't have to reread the disk's directory tree.

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Mousing in File Manager

File Manager is the place to go when you want to copy files from disk to disk or from subdirectory to subdirectory. Under default conditions, dragging a file from one subdirectory to another results in a move of that file, while dragging a file from one disk to another results in a copy. When you drag a file from place to place, keep your eye on the icon near the file name. If the icon disappears, a move will be performed; if it stays, a copy will occur. It's possible to override the defaults by pressing and holding the Ctrl or Alt keys. Holding Ctrl while dragging always results in a copy; holding Alt down results in a move no matter what the destination.

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Running Associated Programs

From a directory in File Manager, double click on a file with a TXT extension. Windows runs Notepad, which then loads the text file you double clicked. Notepad was loaded automatically because TXT files are associated with Notepad. If you'd rather have TXT files associated with another word processor or text editor, you can change the association.

To do this, select a TXT file, then select Associate from the File menu. Windows presents a dialog box in which you can insert the path and name of a program you want to associate with TXT files. Next time you double click a TXT file, Windows will startup the program you specified.

You can use this method to link most of your applications programs with their data files.

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Using PIF with DOS

It's possible to create several Program Manager icons to start one DOS program with different startup conditions. To do this, set up a Program Information File, or PIF, using the PIF Editor. In the PIF, you can specify optional

startup parameters or specify a specific startup directory. This is helpful if you use a DOS word processor for several projects that are maintained in separate subdirectories. Establish a PIF for each project that starts the word processor and switches you to the appropriate subdirectory.

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Deleting Icons

Deleting icons from the Windows desktop doesn't delete the underlying programs. Say, for example, you wanted to get rid of the Windows solitaire game. The desktop icon simply points the way to the executable program, sol.exe. If you delete the icon, the program remains. To save the disk space occupied by sol.exe, you need to go to File Manager or DOS and delete the executable file and the help file for the program. Similarly, having two icons for the same program doesn't mean the program is on the disk twice. The two icons are simply two different ways of pointing to the same program.

Mark Minasi and Tony Roberts
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Backups

Back up win.ini and system.ini regularly. Many people don't realize that virtually all large Windows programs store important configuration info in win.ini. Lose it, and you may have to reinstall all of your Windows apps! It's also a very good idea to back up win.ini before installing a new application. When you deinstall the application, it may not clean up after itself in win.ini. Even after you erase the application from your hard disk, win.ini may still insist it needs the now-erased app. Result: Windows won't start.

Mark Minasi and Tony Roberts
Getting Started with Windows

Quick Install

Do you find yourself reinstalling Windows a lot, to support different mice, video cards, and so forth? It's a pain having to feed Windows disks every few minutes, so here's a better way. Create a subdirectory (call it WINDISKS), and copy all five Windows disks to that subdirectory. Then run setup from that subdirectory. You won't have to do any disk swapping; in fact, you can just walk away during the installation once you've completed the printer setup.

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Getting Started with Windows

Stabilizing Windows

If your system is unstable, and you've tried `virtualhdirq=false`, go to the same area in `system.ini` and try out address ranges with `Emmexclude`. `Emmexclude` tells Windows not to use certain memory ranges—ranges that one of your expansion boards may be using. There's not enough space to go into detail here, but the most common memory conflict arises from Super VGA boards. In the `[386enh]` section, add the line `emmexclude=c400-c7FF`, and restart Windows.

Mark Minasi and Tony Roberts

Getting Started with Windows

Cleaning Up After Windows

Windows is supposed to clean up after itself by eliminating the temporary files it creates. It usually manages this, but if the system locks up or is turned off before an orderly Windows exit is accomplished, Windows will leave some temporary files behind. These files have names that begin with a tilde (~) and include a `tmp` extension. It pays to seek out and delete these extraneous files frequently. If you've specified a temp variable for your system, it will point to the directory where the temporary files are stored. Before deleting these temporary files, be sure to exit Windows, lest you delete a temporary file that's currently in use.

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Getting Started with Windows

Clean Up Your PIFs

During installation, Windows places several PIF files on your system. Most of these are for programs you probably don't have. Don't be bashful about deleting these unneeded PIF files. At 545 bytes each, you may think they're not using too much space, but any file, no matter how small, uses at least one disk cluster. That's 1024 bytes on a floppy and at least 2048 bytes on a hard disk.

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Getting Started with Windows

Don't Backup Your Swap

If you've designated a permanent swap file for Windows under 386 enhanced mode, be sure to remove it before performing a full disk backup. (With some

backup programs, you can simply exclude it from the list of files you want to back up.) Otherwise, you'll spend time and extra disks backing up several megabytes of useless information.

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Get Rid of SYD

In examining files on your system, you may discover a few with a SYD extension. These are backup files created by SysEdit when changes are made to configuration files through the System Editor. It's up to you whether to save these files (in case you want to revert to a previous version) or delete them.

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Replace Important Windows Files

If you delete important Windows files by accident, you can get them back by rerunning setup.exe from the distribution disks. If you have a customized desktop, you'll be relieved to know that all of your work won't be wiped out, but Windows, in reinstalling its default programs group, may create some duplicate icons on your desktop. After rerunning Setup, it's safe to delete extraneous items and groups from your desktop until things return to normal.

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Locate Files on Installation Disks

Setup.inf guides Windows through the setup process, but it also can be used to locate files on the Windows distribution disks without your having to get a directory of each one. Use Notepad or another text editor to read through setup.inf, where you'll find Windows filenames preceded by various numbers. These numbers correspond to the numbers on the Windows disks.

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Easy System Editing

Sysedit.exe is a wonderful utility that Microsoft buried in the windows\system subdirectory and said little about. SysEdit opens up a

Notepad-like editor and calls four important system-configuration files—win.ini, system.ini, config.sys, and autoexec.bat—to the screen for editing. Add this program to your desktop, you'll use it again and again.

Mark Minasi and Tony Roberts

Getting Started with Windows

Install Icons on Program Manager Fast

Using the Program Manager to install icons can be error prone and tedious.

Solution: Drag icons from File Manager to Program Manager

1. Make sure Program Manager is active, and minimize all other windows.
2. Open File Manager (on the Main group).
3. Double-click on the desktop or press Ctrl-Esc to call Task Manager.
4. Click on Tile or press Alt-T or to arrange File Manager and Program Manager windows side by side.
5. Drag the files you want to install from File Manager to the Program Manager group.
6. You can drag any program file (with an EXE, COM, PIF, or BAT extension) or any associated document file.

Note: You can drag files to a Program Manager group window that's maximized, restored, or minimized.

Clifton Karnes

from 101 Essential Windows Tips (COMPUTE Books)

Optimize Program Manager's Size

Unless you specifically arrange it, Program Manager is usually either too large (obscuring your icons) or too small (so you can't see all its icons and groups).

Solution: Use Task Manager to tile Program Manager.

1. Make sure all applications except Program Manager are minimized.
2. Double-click on the desktop or press Ctrl-Esc to call Task Manager.
3. Click on Tile or press Alt-T to tile Program Manager's window.
4. Program Manager will fill the screen except for a band at the bottom that's just wide enough to display minimized icons.
5. If you like Program Manager's optimized size, be sure to save your changes when you exit Windows.

Note: The Tile command was doubtless intended to be used with a group of windows—to arrange them so you could see the maximum of each one. The fact that Tile works with a single window makes it ideal for optimizing any program's window. Just minimize all applications except the one you want to optimize, and use Task Manager to Tile the app.

Clifton Karnes

from 101 Essential Windows Tips (COMPUTE Books)

Arrange All Icons

Icons are both the joy and the curse of Windows. Using Windows' three types of icons will only help you if the icons are arranged in an organized and orderly way. Solution: Learn how to arrange each type of icon.

1. To arrange program item icons (the Program Manager icons on which you double-click to run programs), select one and choose Window, Arrange Icons from Program Manager's menu bar.
2. To arrange document icons (minimized Program Manager groups), select one and choose Window, Arrange Icons from Program Manager's menu bar.
3. To arrange application icons, select one, call Task Manager, and click on Arrange Icons or press Alt-A.

Clifton Karnes

from 101 Essential Windows Tips (COMPUTE Books)

Save Your Configuration

When you've arranged Program Manager's main window, document windows, icons, and document icons just the way you want them, you'll want to save your setup. Unfortunately, Windows only saves your setup when you exit. Solution: Fool Windows into saving your changes. Here's how to do it in Windows 3.0:

1. Load any DOS application other than DOS Prompt by Shift-clicking on it, which loads it as a minimized icon rather than full screen.
2. Exit Windows by double-clicking on Program Manager's control box, and click on Save Changes followed by OK.
4. You'll see the message Application still active; exit the application and then try closing Windows.

5. Click on OK. Your setup has been saved, but you're still in Windows.

Note: When you exit Windows, the first thing it does is save your setup. Next, it automatically closes all Windows applications, giving each a chance to prompt you to save changes, if there are any. Windows doesn't have this control over DOS applications, so it aborts the exit and asks you to manually close each program. Windows 3.1, however, will exit if DOS Prompt is still active, so it's wise to choose another DOS application to stop Windows' exit.

Here's the procedure in Windows 3.1:

1. Hold down the Shift key.
2. Select File, Exit (either using a mouse or the keyboard) or double-click on the control menu box. Windows will save your configuration but won't close.

Clifton Karnes

from 101 Essential Windows Tips (COMPUTE Books)

Maximize and Restore Without Buttons

All windows have minimize and maximize or restore buttons, but they're small and difficult to click on, especially if you're in a hurry. Solution: Double-click on the title bar.

1. Double-click anywhere on the title bar to maximize a restored window.
2. Double-click anywhere on the title bar to restore a maximized window.

Clifton Karnes

from 101 Essential Windows Tips (COMPUTE Books)

View or Edit Text Files

With File Manager, there are two ways you can easily view files: You can associate the file's extension with Notepad (or another text editing program) and double-click on the file, or you can drag the file to a Notepad icon (in Windows 3.1). The first method only works if the file is associated, and the second method requires that Notepad be minimized on your desktop. Solution: Use a

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Recorder macro to load the file at the cursor in File Manager (or MS-DOS Executive) into Notepad.

1. In File Manager or MS-DOS Executive, Select a file to load into Notepad.
2. Open Recorder, configure the program to ignore mouse movement, choose a name for your macro, and start recording.
3. In File Manager, press Alt-F, P, and Ctrl-Insert to copy the selected filename to the Clipboard. Press Tab, Tab, Enter to exit the dialog box.
4. Press Alt-F, R, and type notepad.exe in the text box followed by a space.
5. Press Shift-Insert to paste the name of the file into the text box.
6. Press Enter.
7. Stop Recording the macro, and assign the macro a keypress such as Ctrl-Alt-N.

Clifton Karnes

from 101 Essential Windows Tips (COMPUTE Books)

Display a Wildcard Listing

To view files by extension type in File Manager, you have to go through slow menus and dialog boxes. Solution: Use a Recorder macro to automatically display all files with the same extension as the file at the cursor.

1. Place the cursor on any filename in File Manager that ends with a one-, two-, or three-character extension.
2. Run Recorder and prepare to record a macro.
3. Press Alt-F, P, and press cursor left five times.
4. Press Shift-End to define the part of the filename before the extension.
5. Press Delete.
6. Press *.
7. Press Home, followed by Shift-End to define the wildcard filename.
8. Press Ctrl-Insert to copy the wildcard to the Clipboard.
9. Press Alt-V, T (C for Windows 3.0), and Shift-Insert to paste the wildcard into the text box.
10. Press Enter to display files with the wildcard.

Note: This macro works for files with one-, two-, or three-character extensions, but will not work for files with no extension.

Clifton Karnes
from 101 Essential Windows Tips (COMPUTE Books)

Use Typographic Symbols

Polished documents demand special typographic symbols for single quotes, double quotes, em dashes, and en dashes. Solution: Use Windows extended ANSI character set.

1. To produce beginning and ending single quotation marks, make sure Num Lock is on, and press Alt-0145 and Alt-0146 on the numeric keypad.
2. To produce beginning and ending double quotation marks, make sure Num Lock is on, and press Alt-0147 and Alt-0148 on the numeric keypad.
3. To produce an em dash (often crudely represented by two hyphens --), make sure Num Lock is on, and press Alt-0151 on the numeric keypad.
4. To produce an en dash (the typographic symbol that's longer than a hyphen but shorter than an em dash and is used to indicate ranges), make sure Num Lock is on, and press Alt-0150 on the numeric keypad.

Note: Unfortunately, you can't use Recorder to save these keystrokes in a macro. This is a Recorder bug.

Clifton Karnes
from 101 Essential Windows Tips (COMPUTE Books)

Speed Up Your Printer

Windows' Print Manager lets you multitask while you're printing, but if you try to multitask, you'll find that it slows down printing considerably. Solution: Tell Windows not to use Print Manager.

1. Run Control Panel, found on the Main group.
2. Double-click on the Printers icon.
3. Uncheck the Use Print Manager box.

Clifton Karnes
from 101 Essential Windows Tips (COMPUTE Books)

Automatically Kill Temporary Files

Problem: Windows (and many Windows applications) create temporary files. These files are erased when Windows terminates normally, but when Windows crashes, these files are left behind. **Solution:** Automatically erase any temporary files in your TEMP directory each time autoexec.bat runs.

1. Make sure you have the following two environment variables in your AUTOEXEC.BAT file:

```
set temp=c:\windows\temp  
set tmp=c:\windows\temp
```

2. Near the end of your AUTOEXEC.BAT file, add the line

```
echo y | erase c:\windows\temp\*. * >nul
```

This will automatically erase any temp files in your TEMP directory.

Clifton Karnes

from 101 Essential Windows Tips (COMPUTE Books)

Display Your Name at Startup

The Microsoft Windows startup screen gets boring pretty quickly. **Solution:** Supply your own startup screen. (For this tip, you'll need WinGIF or some program that can save files in rle format.)

1. Rename your win.com file win._om.
2. Open Paintbrush and select Option, Image Attributes.
3. For Units, select Pels, and for Width and Height, choose 640 x 480.
4. Create your startup screen, try to keep it simple, and save it.
5. Run WinGIF, load your screen, and save it as an rle image in your SYSTEM subdirectory.
6. Run DOS Prompt and change to your SYSTEM subdirectory.
7. Enter the following command:

```
copy/b win.cnf+vgalogo.lgo+mylogo.rle win.com
```

Mylogo.rle is the name of the rle image you created.

8. Copy your new win.com file to your WINDOWS directory.
9. Exit Windows and rerun it. You'll see your new startup screen.

Clifton Karnes

from 101 Essential Windows Tips (COMPUTE Books)

Change SysEdit's Default Files

Sysedit always looks for the same four system files, and it always looks on drive C. There's no option to change that. Solution: Edit the sysedit.exe file with Write. Let's say your system files reside on drive D (if you're using Stacker, for example), and you want SysEdit to load your config.sys and autoexec.bat files from the D drive.

1. Copy sysedit.exe (found in your SYSTEM subdirectory) to sysedit._xe, so you'll have a backup.
2. Run Write, choose File, Open, and type in \system\sysedit.exe.
3. When prompted, select No Conversion.
4. Search for c:\config.sys and change the drive letter C to a D.
5. Search for c:\autoexec.bat and change the drive letter C to a D.
6. Save the file.
7. Now SysEdit will load your config.sys and autoexec.bat files from drive D.

Clifton Karnes

from 101 Essential Windows Tips (COMPUTE Books)

Record Notes

When you find a neat Windows shortcut or tip, it's difficult to know just where to store it so you won't forget it. Solution: Use Help's annotation feature to record your notes.

1. Open the help file for any application.
2. Select Edit, Annotate.
3. In the text window, type in your annotation and click on Save.

4. A paperclip will appear on the page to remind you that you have an annotation.

Clifton Karnes

from 101 Essential Windows Tips (COMPUTE Books)

Run a Specific Recorder Macro

Many times, you want to run a single macro in a Recorder file. Solution: Use Recorder's hotkey switch.

1. Make sure your macro specifies a hotkey.
2. On the command line, put `recorder -h hotkey filename.ext`, where `filename.ext` is name of the Recorder macro and `hotkey` is the key combination that normally runs the macro.

For the hotkey, use the following symbols, plus the key name.

Key	Symbol
-----	--------

Alt	%
-----	---

Ctrl	^
------	---

Shift	+
-------	---

As an example, if your hotkey is Shift-F10 and your macro file is named `mymacros.rec`, the command would be

```
recorder -h +f10 mymacros.rec
```

Clifton Karnes

from 101 Essential Windows Tips (COMPUTE Books)

Chapter 7

Down to Business

Most COMPUTE readers use their computers at least in part for work—to do their work, to keep track of their billings, to prepare promotional materials, and to keep up correspondence. This chapter is all about business, your computer, and you.

In this chapter you'll learn how to

- Get the data you need
- Design your way to success
- Protect your data from theft
- Make and save money with your computer
- Improve the speed and performance of even the fastest computer
- Maintain your health and well-being while keeping your productivity high
- Keep track of appointments and deadlines

Success by Design

Many people wouldn't dream of putting a For Sale sign on the front lawn without slapping a fresh coat of paint on the house. The first thing a job-hunter does is get a haircut and maybe a new suit. Cosmetics makers search out perfect models for photos to accompany their products. Why? Because, for better or worse, looks sell.

Still, many home-business owners continue to use uninteresting, blah-looking business cards, letterheads, and brochures, wasting an opportunity to grab the attention of potential customers. That's too bad because now there's no reason why a small business has to look its size. With a computer, a little imagination, and some simple desktop publishing software, it's easy to make your business look like a million without spending a fortune at the printer.

Even if you're not a professional artist, you can jazz up your company's image by choosing bolder typefaces, adding color, or incorporating graphics. It all depends on the message that you want to send—traditional, competent, even outrageous. The key is getting your customers to sit up and take notice. Even a member of the most staid profession can benefit from a business card that shows panache. Professionalism doesn't have to equal boredom.

"The idea is to quickly describe, both visually and verbally, what your company does best," says Rob French, who helps redesign company logos as senior art director at Tatum Toomey & Whicker, a High Point, North Carolina, advertising agency. "If you can create an image that helps make you look more professional, you've got a leg up on the competition."

Rosalind Resnick

Success by Design

Copy from the Pros

How do you get design ideas? "The best thing to do if you're a beginner is to look at other stuff," says Daniel Will-Harris, an author and designer who writes about desktop publishing. "Find business cards and stationery that you like, and start by copying." If you can't tell serif from sans serif, however, it also may be a good idea to look for ideas by leafing through some catalogs at your local print shop or graphic arts store.

Rosalind Resnick

Success by Design

Find Your Own Style

The style of type you use, be it on envelopes, business cards, or even the body text of your letters, tells your customers who you are. That's why it's important to choose a typeface that sends the message you want. A lawyer, for instance, might choose a conservative typeface to suggest competence and evoke trust. A computer consultant might opt for a more modern look to

stress creativity. You can also convey your personal style by combining upper- and lowercase, italic and bold. As a rule, mixing upper- and lowercase type conveys a friendlier feel than using solid uppercase. It's a good choice if your customers are small businesses. Type that is all uppercase tends to impress big corporations, while italic type can make potential customers think of speed and efficiency when they see your card.

Rosalind Resnick

Success by Design

Keep Your Designs Simple

When creating your design, don't get carried away and use a whole lot of rules and a big mess of typefaces. While you want your business materials to convey information, cramming too many words, fonts, or graphics into too small a space will mark you as an amateur.

Rosalind Resnick

Success by Design

Be Consistent

Whichever typeface you choose, be sure to use the same one on all your written materials—letterhead, envelopes, business cards, advertisements, and brochures. If you have a logo, include that on all your materials, too. "The classic example of this is IBM," Will-Harris says. "[It's] used the same type of Bodoni in every ad. Even before you've read the ad, you know it's IBM."

Rosalind Resnick

Success by Design

Dare to Be Different

You don't have to type your letters on hot pink stationery to get clients to notice (and if you did, you might not get the kind of attention you want). On the other hand, you may want to switch from horizontal business cards to vertical. Or you may want to type your letters using a typeface other than the two that are tried-and-true, Times Roman and Helvetica. To make your letters stand out, Will-Harris suggests trying other typefaces such as Trump Medieval, Baskerville, Cheltenham, Galliard, Souvenir, and Palatino. "You can use any of those typefaces and still get a fairly traditional look," he says.

Rosalind Resnick

Success by Design

Add Color

Nobody ever said that business communications had to be conducted in white. Though you'll want your clients to be able to read what you send them, "choosing a color other than white will get people to notice it," Will-Harris says. "If you have something very artistic and you want to use purple paper, that's fine." On the other hand, it's important to beware of certain colors, such as goldenrod, a favorite of grade-school teachers, which can come across as ordinary and cheap. Go for thicker paper. A sheet of 24-pound paper stands out from a sheaf of letters written on 20-pound. And, if you can afford it, use a linen- or cotton-content paper. Even a blank sheet of fine paper carries a message about the person who uses it.

Rosalind Resnick

Success by Design

Design a Logo

A good logo sums up your company's image in one easy-to-remember graphic. If you're not artistic, consider hiring a designer or a local art student. If you don't want to start from scratch, many software programs offer clip art you can use free of charge. You can also use an image from a book, though you'll need to check to see if the photograph or illustration is copyrighted.

Rosalind Resnick

Success by Design

Brighten Up Your Business Cards

"For someone in business for himself a business card can serve as a minibillboard," French says. It's also the one piece of business literature that customers see every day while leafing through their Rolodexes. French recently redesigned a card for a client who installs cabinetry. Before the redesign, the card looked pretty ordinary—a horizontal card with the client's name in the center and his address at the bottom. French made the card vertical, changed the typeface to one that looks hand-tooled, and drew a border that looks like the exterior frame of a cabinet door. The result is a card that sells a service.

Rosalind Resnick

Success by Design

Get Your Computer to Help

Though word processing programs such as WordPerfect and Microsoft Word are fine for publishing the occasional newsletter or flier, you may need to invest in some desktop publishing software as your needs grow. Will-Harris suggests Ventura Publisher for its speed and precision, though he says that Lotus's Ami Pro is easier to use. French, who uses a Macintosh, recommends PageMaker for desktop publishing novices.

Rosalind Resnick
Success by Design

Say It Right

No matter how classy your business materials look, your efforts will be wasted if you can't get the message across to your customers. Misspelled words and grammatical mistakes can cast doubt on your abilities in other areas. "Don't fall into the trap of spending more time formatting your work than you do writing it," Will-Harris says. "If the content isn't good, nothing else will matter."

Rosalind Resnick
Success by Design

Your Design Is Your Fortune

It's important to realize how valuable a first impression is. The first time you saw the car you drive, the house you live in, perhaps even the person you're involved with romantically, chances are that something clicked.

Something made you look a second time. That's the impact you want your business card and documents to have. No matter what your first impression was, though, you probably wouldn't stick with a car, a house, a partner, or a friend if the quality weren't consistent throughout. That's why you should approach every design decision from letterhead to invoice with the same industrious attitude. If you make a good first impression and live up to its promise, success can't fail to find your door.

Rosalind Resnick
Success by Design

Professional Victims

My wrists hurt. My eyes throb. No, I haven't been mugged. I am a victim of my computer.

Too much Solitaire. Too much Tetris. Enough repetitive motions to cause pain. You know the kind of pain I'm talking about if you play addictive games. Those are the ones you start playing as you wait for the last calls of the day to come. Then you keep playing for another hour figuring you'll only sit in traffic if you leave. Suddenly it's 8:00. Your eyes are tearing up from continual stress and focus, but you play anyway. That's addiction.

After days, weeks, and months of repetitive activity—not just playing games but engaging in business activities as well—you could feel severe pain in your wrists, jarring strain in your eyes, or an aching soreness in your back, shoulders, or neck.

Constant work at the computer can lead to serious and permanent damage. Julia S. Lacey spent three years studying the effects of computers and stress in the workplace, and the findings are distressing. One of the most debilitating diseases, carpal tunnel syndrome, which causes severe pain in the hands, wrists and arms, now accounts for 50 percent of all workplace illnesses, according to the Occupational Safety and Health Administration (OSHA). Five years ago the figure was only 2 percent.

Lacey's CRT Computer Wellness Survey shows 67 percent of full-time computer users have headaches, 48 percent have neck aches, and 29 percent have both backache and shoulder ache. "That's not an easy way to get work done," she says.

She advises workers to get good equipment and set it at proper heights: Monitors should be at eye level; keyboards should be placed so that your elbow forms a 90-degree angle between your shoulder and hand.

You should also take breaks every 30 minutes. "You will be healthy and pain-free only if you move about at your workstation and get away routinely for work-productivity breaks," says Lacey, who consults on ergonomics for companies and has coauthored with two doctors a book called *How to Survive Your Computer Workstation: 15 Easy Steps to Workstation Comfort*. "Every study on the human body reinforces this concept." Stretching every five or ten minutes for a few seconds will also help your body, which was not designed to sit in a chair for long periods. Taking frequent productivity breaks, such as going for mail, can help reduce stress, Lacey asserts.

Other surprising suggestions based on research make Lacey's book a must-read for designing offices in the home or large businesses. For instance,

to reduce eyestrain, she suggests that you

- Move the monitor four feet from the eye.
- Turn down the monitor light to the lowest you can see; then raise it a tad to reduce eye fatigue and stress.
- Blink, if you have strained or dry eyes. To remember this, place a note on your monitor that says, "Blink."

To reduce stress, Lacey suggests several exercises and tips, including the following:

- Glance away from the monitor often to refresh your eyes.
- Breathe deeply to lower blood pressure and provide a feeling of tranquility.
- Get away from the monitor.

"Some suggestions are contrary to long-accepted company practices," says coauthor Howard Levenson, O.D., of the Marin Optometric Group in San Rafael, California. "However, when frequently refreshed, workers feel better and are more productive. Attendance records improve, and medical claims decrease."

Proper computer use need not be expensive. Many people have reduced a wrist ache by using a foam pad that fits in front of the keyboard. You can find wrist supports in computer stores.

Lacey also cautions that problems you experience might not be computer related. For instance, optometrists report that 30 percent of people have visual problems that are undetected, uncorrected, or undercorrected. It's no wonder if these people blame their monitors. People who are overweight have frequent backaches. They may blame their chairs, although in reality their weight causes the pain.

Once I have done my exercises and rested my eyes, I can return from my break to play Tetris with a relaxed mind and clear eyes.

Daniel S. Janal
Personal Productivity

Getting Organized

Information anxiety is the scourge of the 1990s, but it's nothing that a trip to the software doctor can't cure. The prescription isn't pills; it's PIMs—Personal

Information Managers.

Steve Garfein, an Irvine, California, consultant who works at home and uses a Windows-based PIM from Polaris Software, got hooked on PIMs three years ago.

"For years, I had an office manager to perform many of the functions that PackRat does," Garfein says. "I no longer have an office manager. I wouldn't know what to do with one."

Software that tracks appointments, files away addresses, and organizes the clutter that tends to pile up on every desk has come a long way since Borland International introduced SideKick in 1984. Today, there are some 40 PIMs on the market, ranging from relatively simple programs that track birthdays and Boy Scout troop meetings to sophisticated project managers capable of handling million-dollar projects. Fully featured programs with capabilities for note taking, schedule tracking, contact management, and planning now start at under \$100.

"Word processing was the application for the 1980s," says Michael Jimmerson, a Tucson lawyer who uses PackRat. "I think that PIMs are going to be the software for the 1990s."

Rosalind Resnick
Getting Organized

Plan Your Ascent

I've studied time management for years, and in my quest for organization, I've used or experimented with a number of computer tools, including SideKick, PC Tools Deluxe Desktop, Active Life, PackRat, and YourWay. All these programs have their strong points, but none of them really fit me. I had a strong feeling that I could be doing better at time control and that my tools could be more effective.

Then I found Ascend (NewQuest, 2550 South Decker Lake Boulevard, Salt Lake City, Utah 84119; 800-887-1814; \$299). It's a PIM (Personal Information Manager), but it's different from the ones mentioned above. Ascend was designed by a time-management company, not a software company. NewQuest is a division of the Franklin Institute, and Ascend is a computer program based on the Franklin system and the Franklin Day Planner. This has crucial implications for the way you use Ascend, and it accounts for the program's success as a tool.

First, some background: The Franklin Institute has been doing time-management consulting for years, with a client list any company would envy. In-

tel, Hewlett-Packard, Apple, Merrill Lynch, and CitiCorp are just a few noteworthy Franklin graduates. Franklin developed the Day Planner (a paper-based system) to help the company's clients control their time and their lives. The important point here is that the Franklin Institute has a proven track record in teaching time management and in producing time-management tools.

The computer has obvious advantages as a time-management tool (and some disadvantages, too), so Franklin, in concert with NewQuest, developed Ascend, which is a Windows-based program.

You'll realize that this product is different as soon as you open the box. Included are the software; three manuals; a Franklin Day Planner, complete with a set of forms and a storage binder; a four-cassette training seminar with a workbook; a videocassette; and a Franklin catalog.

Although almost everyone will be tempted to install the software and start using it right away, you should take the time to listen to the four tapes and use the workbook. These tapes discuss in detail how to use the Franklin system and the Day Planner. If you don't listen to the tapes, you'll only scratch the surface of what Ascend can do for you.

The Franklin Institute's approach to time management requires discipline, but it's easy to describe. You begin by defining your most important values as a human being. From these values flow your long-range goals. From these long-range goals flow intermediate goals, and from these intermediate goals you construct your daily task list. This hierarchy of values, long-range goals, intermediate goals, and daily task list is called the Productivity Pyramid, and it's at the heart of the Franklin system. If you spend the time to develop your personal Productivity Pyramid, your daily tasks will be a significant part of your long-range goals and your human values. As a consequence, you'll feel a deep satisfaction with yourself.

After listening to the tapes and getting in the Franklin groove, you'll be ready to install the software. Instead of taking the usual 5MB–10MB of hard disk space, Ascend uses less than 1.5MB. But don't be fooled by this program's modest size.

Ascend boasts an MDI-compatible interface with a toolbar sporting buttons for each of the program's modules. Most of these modules mirror elements in the Franklin Day Planner. Included are Appointment Schedule, Prioritized Daily Task List (an energized to-do list), Daily Record of Events, Telephone Book, Red Tabs (important files), Productivity Pyramid, Master Task List, Focus (which blocks the clutter on your screen and gives you all the information on your highest-priority uncompleted task), Calendar (a week-at-a-glance view), TurboFile (a free-form index), Daily Journal (for your thoughts),

Quotes (for your file of inspirational quotes), and Network (for viewing other Ascend users' schedules on a network).

You can print the contents of these modules on letter-sized paper or on the special Day Planner paper provided.

The heart of the system is the Prioritized Daily Task List module, and most of the other modules are integrated with it or support it in one way or another. In the Daily Task List, you list each task you want to complete for the day. You then assign each a priority of A (vital tasks that must be done), B (important tasks that should be done), or C (trivial tasks that could be done).

Next, you rank the tasks within each group with numbers and sort the entire list. Prioritizing, ranking, and sorting can be done by hand, or you can use special dialog boxes that make the process easy.

I've spent most of this page talking about the Franklin system rather than specifically about Ascend, but Ascend is more than just software. It's a powerful tool specifically designed to implement a thoughtful, flexible, and elegant time-management system.

Clifton Karnes
Point & Click

What a PIM Does

Here's why PIMs are so popular:

1. A PIM means never missing an appointment. PIMs can be programmed to sound an alarm or flash a message to alert you to a meeting you have to attend or a phone call you're scheduled to make. Karri Riedel, a secretarial temp in Perrysburg, Ohio, says she uses Chronologic's Instant Recall on her home computer to keep tabs on birthdays, doctors' appointments, and even her daughter's Brownie meetings.
2. A PIM means never losing a phone number. PIMs let you create an electronic database that stores a person's name, address, phone number, fax number, nickname, birthday, favorite restaurant, and other helpful tidbits. If you have a modem, you can even command the PIM to dial the phone number for you at the touch of a key.
3. A PIM means never letting a deadline sneak up on you. PIMs that double as project managers not only tell you when a project is due but generate detailed graphs and charts that show what you (and your colleagues) should be doing every day in order to get the job done on time. SureTrak Project Scheduler helps you see how a project is going, pinpoint trouble,

and get yourself back on track. For novice project managers, On Target has a scheduling assistant that guides you through the planning process.

4. A PIM means never losing an important file, or even an unimportant one. PIMs excel at sifting through electronic data to find the item you're looking for. Most word processors lack such powerful search features, forcing you to hack your way through a thicket of DOS filenames. Info Select, for example, lets you retrieve files by simply typing the letter G (for get) plus the first two or three letters of the topic you're searching for. PIMs can also keep tabs on papers stashed in your filing cabinet. Garfein says he logs all his paper files by keyword so he won't have to search for them manually.

5. A PIM means never retyping anything. Most PIMs let you export data to word processors, spreadsheets, and other programs. PackRat, for example, offers a dynamic data exchange (DDE) macro that lets you effortlessly plug information into Microsoft Word for Windows, Excel, and Ami Pro.

Garfein says he uses PackRat before meeting with a client to ferret out pertinent information. Then he dumps the data into his word processor, prints it out, and files it in his Day-Timer. "PackRat helps me focus on that client as if he were my only client," Garfein says.

6. A PIM means never looking like an amateur. PIMs not only help you get your own affairs in order, but many of them also have powerful report-generating features that show the world you're organized, too. That's important if you need to make business presentations or print out data in a form your colleagues can understand. Symantec's GrandView, for example, lets you turn rough outlines into well-organized plans, proposals, reports, and even Harvard Graphics slides.

7. A PIM means never having to read between the lines. Unlike paper calendars and schedulers, PIMs give you lots of space to enter information about important events. Info Select, for example, can accommodate as many as 10 million characters per database. Instant Recall lets you type up to 30 pages per entry. "I can't see myself going back to a manual calendar," says Riedel, who uses Instant Recall.

8. A PIM means never having to make a list. Because PIMs let you build your own database of people, events, and topics, they're useful for market research and customer mailings.

9. A PIM means never having to throw anything away. Because PIMs store information electronically, there's never a need to clean out the file cabinet only to find out two days later that you threw out the one piece of information you really needed. Charles Olsen, a Dickinson, Texas, mainframe computer operator, says he's using Agenda to store notes for a science fiction

novel he's working on. He uses one Agenda view (or category) to store several detailed items about helicopter specs.

10. A PIM means never losing those little pieces of paper. When PIMs like Instant Recall, Info Select, and SideKick are run memory resident, you can pop up an electronic notepad, write a note, and retrieve the information later. PackRat offers the same convenience for Windows users. "I'd write things down on a little piece of paper; then, six months later, I'd find the piece of paper and have to call and apologize," Olsen says. "With Instant Recall, I can keep the promises I've made."

There's only one good reason not to get a PIM: if you find the idea of becoming efficient terrifying.

Rosalind Resnick
Getting Organized

Organization Tools

Unlike software that helps you write letters and crunch numbers, personal information management software doesn't fall into one neat category.

Some programs, such as Micro Logic's Info Select 2.0 and Chronologic's Instant Recall 1.2, track everything from the names of contacts to birthdays. Others, like Symantec's On Target and Time Line 5.0 and Primavera Systems' SureTrak 2.0, are actually specialized project managers capable of managing not only your own information and appointments but also those of your entire department or company.

General-purpose PIMs are ideal for lawyers, accountants, and other people who sell their time and bill by the hour. Some PIMs can time client phone calls to the nearest second. PIMs are also good for people who sell products or information and need fast facts at their fingertips. Project-management software, by contrast, is better suited to event planners, advertising executives, software developers, and other people who manage projects that take more than a couple of days and involve a team of people. Some examples of project-management software are Microsoft Project, Time Line, and Texim Project. They help a manager—or a team—keep track of a project.

"A PIM tracks your time hour by hour by hour: Meet Bill, paper due—that kind of stuff," says Scott Davison, marketing manager for Symantec's project-management group. "Project-management software lets you build a fairly complex model to track your projects. Instead of just getting a snapshot of what's going on, you see that Task A can't start until Task B is finished."

If this makes project-management software sound a little daunting, in some respects it is. Time Line, a corporate favorite, has helped major defense contractors keep tabs on multimillion-dollar projects. Time Line also helps managers keep track of things like tasks split between two employees when one of them goes on vacation.

Even so, project-management software isn't just for Fortune 500 companies, Davison says. To target smaller businesses, Symantec recently introduced On Target, a simplified project-management program that runs in Microsoft's Windows environment.

"What we realized was that there was a large audience of middle managers and small-business people who could benefit from this technology but who thought it would be too complex to learn," Davison says. "Now general business people are recognizing this as a valuable tool, not just the professionals with calculators on their belts."

Rosalind Resnick
Getting Organized

Workalikes

It's important to find a PIM that works the way you do.

If your organization or business is small and you don't have many appointments or names to keep track of, you'll probably be able to get by just fine with a paper calendar, a Rolodex, a spiral notebook, and Post-it notes.

But as your company gets bigger and more complex, you ought to consider an electronic organizer to manage your data and your time. Marketers, journalists, public relations people, event coordinators, and scout troop leaders can all benefit from PIMs. Lawyers can use PIMs to track filing dates; doctors can use PIMs to schedule patients.

Once you've decided to buy a PIM, figure out which aspect of your business is disorganized and buy a program to solve your specific problem. The PIM should let you take notes, manage customer contacts, track your schedule, and plan activities. Look for a program that can perform quick searches to isolate individual notes.

At the same time, it's a good idea to stay away from any program with so many bells and whistles that it will only confuse your organization efforts. And don't buy a program that takes more time to learn and to keep up than it now takes to paw through your clutter.

If you spend a lot of time on the phone and need rapid access to large stacks of notes and other text-based data, consider Info Select 2.0, Instant Re-

call 1.2, or SideKick 2.0, all of which are TSRs that pop up at the touch of a key. For Windows users, PackRat 4.0 is a PIM created to take advantage of Windows' powerful linking features.

Agenda 2.0 is a powerful tool for people who need to organize and cross reference large amounts of text-based data. Who-What-When 2.2 is ideal for tracking appointments. GrandView 2.0 is best if you prefer to manage your information by outlining. Also take a look at Ascend, a PIM created by the Franklin Institute.

It's also important to remember that whichever PIM you buy, it's only as useful as the data you put into it.

"I think there's this voodoo that's supposed to occur when you get organized electronically," Tarter says. "A disorganized person isn't going to get organized just by installing a PIM on his computer." But a little organizational effort goes a lot further when a PIM is involved.

Rosalind Resnick
Getting Organized

Purchasing a Computer

The linchpin of home office success is the personal computer. That one box provides almost all of the tools you'll need, from those that crank out correspondence or bills to the ones that manage numbers or volumes of data. It plays the role of assistant, secretary, coworker, confidant, accountant, and half a dozen others, all without salary demands or time off.

Because it provides so many options with so few drawbacks, it's crucial that you have the perfect personal productivity PC in front of you. Since so much depends on its ability to get jobs done, you need the best-fitting computer you can find.

But don't fall into the trap of thinking the best PC also has to be the most expensive. Far from it. You can equip your home office with an ideal PC for as little as \$1,600.

The perfect PC can begin with an almost empty box—a computer sans drives and monitor—or it can start with a basic system already configured with an adequate array of memory, disk drives, and video card. Though either opening gambit works, the trend today is for sellers to assemble a lineup of stock PCs and then let you pick. You can, of course, build the perfect PC from scratch, but the advantages are usually so inconsequential—the main one being an ability to name the brand of every component—that it's rarely worth your time.

Instead, start by buying a capable 386 IBM PC compatible, selected for low price and high power. It doesn't matter whether you buy your PC by mail order or in a retail store, a superstore, or even a discount warehouse or shopping club. Just match the computer's specifications with this list of features.

- 20-MHz 386 microprocessor
- 2MB RAM
- 100MB or larger hard drive
- 5 1/4- or 3 1/2-inch high-density floppy drive
- VGA monochrome monitor and video card with 256K of video memory
- Keyboard
- MS-DOS 5.0 or DR DOS 6.0
- FCC Class B approval

PC prices continue to plummet—especially for machines centered on the 386. You can find this core computer for a little more than \$1,400. In fact, several mail-order firms break or nearly break this barrier. Closer to home, most cities sport a handful of entrepreneurs who will assemble a PC like the one above for about the same price.

To be on the safe side, budget \$1,500–\$2,000 for the foundation of your perfect home office PC. That should account for shipping charges (mail order) or sales tax (local), as well as for any slight price differences if you're set on a particular model.

If you need to run Windows, you can get by with the basic configuration, but if you use it intensively, you'll want more memory, a larger drive, and color VGA.

Gregg Keizer
Perfect PC

Do You Really Need Windows?

Windows makes heavy demands on your computer and may require that you upgrade. But if you consider your tasks individually, perhaps you can get along without Windows. Here are some low-cost ways to punch up your machine and to get along better in DOS.

A 100MB hard drive may seem on the small side, but with Stacker, an on-the-fly compression/decompression utility, you can effectively double the size of the drive (certain kinds of files compress more compactly than others).

More memory? You'll find that 2MB is enough for the basic DOS word

processor, database, spreadsheet, and telecommunications applications. Multitasking—running more than one program simultaneously—is possible within that much RAM with DESQview or GeoWorks.

Or you could opt for a task switcher instead. Software Carousel can segregate that 2MB of RAM into two or three separate and smaller work areas and then flip between applications with the press of a couple of keys.

Gregg Keizer
Perfect PC

Do You Need Color?

Though color brightens up games and educational programs and is a prerequisite for multimedia presentations and some graphics work, you won't mind the monochrome VGA monitor if your home office work revolves around words, data, and numbers. Most desktop publishing can be done without color as well.

Gregg Keizer
Perfect PC

Getting Legal Help

By investing in legal software, you can prepare your own will, contracts, leases, and other legal documents with the speed, ease, and accuracy once available only to legal professionals. And now that lawyers often charge \$100 an hour or more (frequently for documents generated by professional legal software similar to personal legal software), home legal software makes more sense than ever.

Prices are coming down, and programs are getting friendlier. You owe it to yourself to give legal software a try. The Software Publishers Association says that sales of forms software, which includes self-help legal programs, soared by 84 percent through the third quarter of 1991, more than four times the growth rate of the software industry as a whole.

To see why legal software is catching on, consider the case of Harry Hunter. Hunter, who runs a consulting and tax accounting practice in Union, New Jersey, purchased Parsons Technology's It's Legal to help him draft customer contracts.

"But I noticed it had a collection letter, too," Hunter recalls. "So the first thing I did was use it to draft a letter to a client who owed me money. I didn't expect to get paid, but I hoped that the letter and the deadline would at least generate a phone call. Then I expected to take the letter to my lawyer and

have him finish the collection. Instead, I got full payment from the client. I never had to show it to my attorney.”

The bottom line on this single transaction: Hunter saved the 30 to 40 percent he would have had to pay his lawyer to collect the money, a savings that more than paid for the program.

Unlike do-it-yourself tax software, self-help legal software has taken awhile to catch on. Steve Elias, copublisher at Nolo Press (the Berkeley, California, firm that produces WillMaker, a popular will-drafting program), says many people still fear that they’ll mess up if they attempt to draft a legal document on their own.

Those fears aren’t entirely unfounded. Even so, legal software represents a giant step beyond fill-in-the-blank legal documents. And unlike the paper forms, computer-generated documents can be updated easily and printed out neatly and professionally. Simply plug your answer into a program’s question-and-answer format, and out pops a document in impeccable legalese.

Rosalind Resnick and Gary Taylor
Desktop Legal

Legal Software Not for Everybody

Despite the many pluses, however, legal software isn’t for everybody. If your legal problem is complex or if you’ve been sued or charged with a crime, hiring a lawyer is your best bet. Because of estate tax implications, Elias suggests that small-business owners and people with estates worth more than \$600,000 consult a lawyer when drawing up a will. It’s also important to note that few legal software programs will work for Louisiana, which, unlike the rest of the nation, has a legal system based on the French civil code rather than English common law.

“People want life to be simple, but it’s not,” says Paul Stokes, a trusts and estates lawyer at Kelley Drye & Warren in Miami. “Even when people have small estates, the planning has to be careful. Little mistakes are magnified, and there are all kinds of little traps in a will. But there certainly is a need to develop legal services for the middle class, and legal software is a step in that direction.”

Even the software publishers acknowledge their programs’ limitations. “We don’t publish them to take the place of a lawyer, just to make the law accessible,” says Monica Jackson, product manager of MECA’s Home Lawyer.

Rosalind Resnick and Gary Taylor
Desktop Legal

The Case for Legal Software

With those caveats in mind, it's reassuring to know that, when it comes to shopping for legal software, there are choices available to fit most people's needs and budgets. Softhink/Expert's one-purpose Expert Will retails for only \$14.95, while other programs, like BLOC's Personal Law Firm, that do everything from drafting contracts to writing collection letters and prenuptial agreements cost less than \$100.00. Specialized programs that create employee handbooks and other corporate documents typically cost more.

Here's a look at how some of the leading programs in the legal software field stack up:

- WillMaker is the granddaddy of legal software programs. It was first released by Nolo Press in 1985 and has sold nearly 300,000 copies since then. Besides its easy-to-use software, the strength of the WillMaker program is its 200+-page manual containing detailed and accurate information on a variety of topics related to making a will. With WillMaker, you can specify up to 16 different bequests; name alternate beneficiaries; create trusts for your minor children; choose a way to pay your debts, funeral expenses, and estate taxes; and protect against overlooked heirs.
- BLOC Publishing's Personal Law Firm is the largest and most comprehensive legal software program available. It creates documents for both personal and business use. Its 30 documents include such exotics as Trade Secret Protection, License of Intellectual Property, Warranty Agreement, and Pre- and Post-Nuptial Agreements. The program's two 250-page user's guides explain features, answer questions, include sample documents, and feature a glossary and an index of legal terms.
- Hyatt Home Lawyer (\$79.95), produced by MECA Ventures with help from the Hyatt law-clinic chain, isn't as comprehensive as Personal Law Firm, but it's less expensive and helps you draw up most of the personal and business documents you're likely to need. Among the program's 19 documents are the following: a will, an employment agreement, a power of attorney, a bill of sale for a motor vehicle, and an independent contractor agreement. There's also an online glossary of legal terms to help you wade through the legalese and a help key.
- It's Legal, from Parsons Technology, offers a full range of legal documents—a will, a living will, a lease, a promissory note, a general power of attorney, and others—at an attractive price. The living will, a document not

found in several other programs, lets you decide if you want to be kept alive should you become terminally ill or require life support and lose your ability to think rationally. Unfortunately, there is a downside: Few of It's Legal's documents will help you run your business.

- Expert Will and Home Will Kit (\$14.95 and \$29.95 respectively) are produced by Softhink/Expert, a subsidiary of BLOC Publishing. These products offer a low-cost solution for making your will. Expert Will prepares simple wills only, while Home Will Kit generates a living will as well.
- The Desktop Lawyer (\$99.95) is unlike the other legal software programs in that it doesn't use a question-and-answer format but functions as a document library on disk. The user simply chooses from 300 documents; then the program copies it, loads it into the word processor, and customizes it to suit your needs. The Desktop Lawyer is the brainchild of Orlando lawyer Laurence Pino, who also offers a consultation service for \$100.00 a year that lets you consult with lawyers by phone as questions arise.
- JIAN Tools for Sales offers a line of legal products including LivingTrust-Builder and AgreeMentor, each aimed at a specialized area of the legal assistance market. Like the Desktop Lawyer, these products require that you have a separate word processing program for customizing documents.

Rosalind Resnick and Gary Taylor
Desktop Legal

What to Look For in Legal Software

No matter which legal software program you buy, make sure it includes the following useful features:

- A helpful reference manual: Managing your legal affairs consists of far more than simply drafting documents and filling in blanks. WillMaker's manual, for instance, gives advice on how to plan your estate, how to sign and update your will properly, how to name a personal guardian for your children, and other topics related to the will-making process.
- Clear language: Though it's important for your document to be legally accurate, it's also essential that you understand what you're signing. If you

can't make your way through legalese, make sure the program you buy offers onscreen definitions and user help to make everything understandable in layman's language.

- **Interactive capability:** The question-and-answer format used by most legal software programs makes drafting legal documents quick and simple. "Comparing the program to forms in books, I'd say it's easier to use because you don't have to type anything," says Harry Hunter, who recently bought *It's Legal*. "You just plug in the information by answering the questions. It minimizes error because you can customize the letters to the situations."
- **Flexibility:** No matter how routine your legal problem may seem, you need a program that lets you tailor each document to fit your needs. If you don't think your kids will be responsible enough to handle an inheritance until they're 30, you need a program that will create a will to hold the property until then. And, since state laws vary, it's important to find a program that creates binding documents for your particular state. (In Louisiana, that can be a problem.)
- **Good text editing:** Unless you're the type who does crossword puzzles in pen, it's a good idea to buy a program that lets you save your document to disk so you can revise or finish it later. The program should also allow you to review your document onscreen and revise it before printing.

Rosalind Resnick and Gary Taylor
Desktop Legal

Online Legal

Unsure about springing for legal software? If you have a modem, there's plenty of law-related information available online.

CompuServe offers legal insights on its Legal (LAWSIG) and Work at Home (WORK) forums. Forum members who log on to LAWSIG can browse through such libraries as Computer Law and Software and Lawyer-to-Lawyer, an information exchange for attorneys. What's more, you can even leave your legal questions in messages on a bulletin board called Attorney Wanted. Lawyers thumb through the messages and post answers, giving tips and recommending referrals.

And, unlike scheduling an appointment to see a lawyer in his office, the online advice is free—apart from CompuServe's connect charge.

"We usually give general advice," says Noel Adler, a New York lawyer

who doubles as LAWSIG's sysop. "When somebody poses a question, anyone with an answer can answer it."

America Online, another popular service, offers law-related articles in its Microsoft Small Business Center such as "Avoiding Legal Problems," "Copyright Basics," "Obtaining Good Legal Advice," and "Negotiating Lease Contracts."

For more in-depth information, consider logging on to Dialog's Knowledge Index, a new online service that gives home computer users access to nearly 100 Dialog databases during evenings and weekends at a reduced rate. Subscribers get access to the Legal Resource Index (LEGA1), which features articles from more than 750 law journals and reviews since 1980, and BNA Daily News (LEGA2), which offers daily news coverage of national and international government and private sector activities.

Over at Prodigy, members can sign up for LawPhone, a prepaid legal plan. Though LawPhone doesn't give answers online, it does offer discounts on lawyers' hourly rates plus unlimited consultations by phone or letter.

LawPhone Advisory Communication Systems, a 50-state network of private attorneys, charges \$60 for a three-month membership plus a \$15-a-month continuation fee or \$180 for an entire year. Prodigy members can sign up for LawPhone online.

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Desktop Legal

Legal Advice

Legal software is fine for routine legal needs, but it's no substitute for the skill and judgment of an attorney. If you're injured in an accident, if you've been charged with a crime, or if you and your business partner have decided to call it quits, it's probably time to call a lawyer.

Here's how to make an intelligent choice of attorneys.

Ask for referrals. The best way to find an attorney is to make a list of lawyers who've achieved good results for family, friends, and other people you trust. Even if these lawyers tell you they don't handle your kind of case, they'll often be able to refer you to a lawyer who can. Another good source of recommendations is your state or local bar association. Many bar groups offer this service free and can arrange initial consultations at a minimal charge.

Shop around. Depending on the lawyer's expertise and reputation and the size and location of the law firm, lawyers' rates can range from \$50 an hour to more than \$200 an hour. If you don't have much money, your local

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legal aid society may be able to provide a lawyer free. Savvy legal consumers typically shop around, visiting—or at least calling—three or four lawyers before making a choice.

Get answers. Before going to see a lawyer at his office, briefly state your problem and then ask the following questions:

- Have you ever handled this type of case before?
- How much will you charge for our first meeting?
- What's your estimate of the total fee?

If you're satisfied with the answers, make an appointment. Prepare an outline of the facts of your case plus all documents and a detailed list of questions.

Exercise your right to say no. Don't let yourself be pressured into hiring the first lawyer you interview. If you're uncomfortable or have any doubts, press on with your search. Run—don't walk—from any lawyer who promises to win your case or tries to bowl you over with legal mumbojumbo. A lawyer with your best interests at heart may even advise you to try to settle your dispute out of court.

Put it in writing. Once you've decided which lawyer to hire, get a written contract that spells out how much he or she intends to charge. Most lawyers charge by the hour, though some lawyers—especially those who handle accident cases—work on a contingent fee. This means the lawyers get a percentage of the jury award or settlement if they win the case but no fee if they lose. It's important to note, however, that even these lawyers will charge you for court costs and expenses, even if you're not awarded any money.

Rosalind Resnick and Gary Taylor
Desktop Legal

Getting Financial Help

While financial software can certainly make your life simpler, it can't make you wealthy unless you yourself are prepared to make some savvy decisions. Let's face it—even the world's most sophisticated software program can't tell you which stock will go up or whether to buy term or whole life insurance.

The secret, say the professionals, is solid tax and financial planning, not betting the farm on a hot new issue or seeking out some shady accountant who promises to save you a bundle.

"Good planning is not going to make you rich," says Harold Evensky, a financial planner at Evensky & Brown in Coral Gables, Florida. "You're going

to get rich by doing whatever you do for a living. Good planning is not a way to beat the system. Rather, it's an intelligent way to work within the system."

If your goal is a comfortable nest egg and long-term financial success, here's what Evensky suggests:

- Cover your assets: Protect yourself against disaster with life, health, and disability insurance.
- Save for a rainy day: Set aside enough cash to cover at least three months' living expenses.
- Don't put all your eggs in one basket: Diversify your portfolio. Don't just buy bonds, for example. Buy government bonds; corporate bonds; short-, intermediate-, and long-term bonds; and taxable, tax-free, and tax-deferred bonds.
- Don't hide from the tax man: Invest your money in whatever you think will yield the highest returns. After all, it's not how little you pay in taxes; it's how much you get to keep after your taxes are paid.
- Plan to die (and to live): Make a will. Let your heirs know how to handle your estate after you're dead or incapacitated.
- Plan to plan: Start early. Be realistic. Get good, qualified, independent advice.

That said, don't forget tax planning, either. Though Congress closed many of the best loopholes in the late 1980s, you can still save on taxes by buying an IRA, socking away part of your paycheck in your company's 401K plan, or stashing some excess cash in a Keogh plan if you're self-employed. You can also deduct charitable contributions, medical expenses, business travel, and home office expenses if you meet certain IRS requirements.

One tax break that looks like it's here to stay is the mortgage-interest deduction on personal residences, says Richard Kohan, a senior manager at Price Waterhouse in New York. That's why it makes sense to consolidate the credit card bills you're financing at 18 percent and take out a home-equity loan at much lower rates, he says.

"With interest rates as low as they are, the best tax shelter that you can have is probably your home," Kohan says.

Rosalind Resnick
Wealth and Taxes

Wealth of Information

There's probably a money-management program out there that's perfect for you. And, if you're conscientious about using your software, when tax time rolls around, you can hit a few keys and all the information slips neatly into a software program that computes your taxes.

Most money-management software falls into one of two categories: day-to-day cash management and long-term financial planning. A few programs (Market Base and Andrew Tobias' Managing the Market, for example) even help you track the stock market.

Intuit's Quicken, by far the most popular personal finance program, looks and works just like a checkbook and register. Quicken helps you pay your bills, track your income and expenses, budget, and keep track of your stock portfolio.

The other leading personal finance program is Andrew Tobias' Managing Your Money 7.0 by MECA Software. Managing Your Money does everything Quicken does and packs in plenty of pithy advice from the financial expert and bestselling author whose name is on the product. Managing Your Money also has everything you need to run a home business, including an appointment calendar and an electronic card file. The program also links up with MECA's TaxCut and Managing the Market, which automatically updates stock quotations online by logging on to Dow Jones News/Retrieval. Also watch for forthcoming personal finance software from Parsons.

If your goal is active portfolio management and long-term financial planning, consider programs like Dollars & Sense and Money Magazine's WealthBuilder. Introduced in 1989 by Reality Technologies, WealthBuilder bills itself as "the program that picks up where Quicken leaves off." With Wall Street scandals breaking almost daily and the nation's S&Ls drowning in debt, your computer may be the only investment adviser you can really trust.

Rosalind Resnick

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Tapping the Money Line

If your PC is equipped with a modem, financial help and information are only a phone call away. But be prepared to pay for it. Dow Jones News/Retrieval can run you close to \$200.00 an hour after access fees, surcharges, and per-character charges. On the other hand, DJN/R is the only service with up-to-the-minute stock quotes—and that may be just what you need. If you can wait until the trading day is over, you can get daily stock quotes on GENie as part

of your basic service for an access fee of \$4.95 per month.

For financial novices, Prodigy offers a wealth of financial information for the monthly membership fee of \$12.95. Prodigy's Money section includes advice on financial planning and home business, a Money Talk bulletin board, and more. For \$14.95 more per month, Prodigy members can log on to Strategic Investor, a database with reports on more than 4500 individual stocks and 2500 mutual funds plus market news, charts, and columns from Investor's Business Daily.

If you're an active investor willing to spend a little more, CompuServe's Company Analyzer, a surcharged service, offers in-depth reports on individual stocks. The Analyzer menu lets you see return on \$1,000 invested, earnings/growth forecasts, a management discussion, and the stock price history going back to 1978. CompuServe also offers online advice from a team of stock, bond, and currency market analysts, online brokerage services, and a database of business articles.

CompuServe also gives you stock quotes on a 20-minute delayed basis for 9,000 stocks traded on the nation's major exchanges; pricing history on 46,000 stocks, bonds, warrants, and mutual funds from 1974 to the present; Value Line forecasts of roughly 1,800 companies; and access to corporate reports and financial statements from Standard & Poor's and Disclosure. CompuServe's basic access charge is about 22 cents a minute. Some reports carry surcharges.

If you want to fly first-class and don't mind paying, sign up for Dow Jones News/Retrieval, the online service run by the same folks who put out the *Wall Street Journal*. Besides realtime stock quotes, DJN/R is the only service with the full text of the Journal, Barron's, Business & Finance Report, and American Demographics, plus reports on SEC filings.

Rosalind Resnick
Wealth and Taxes

Save and Make Money with Your Modem

Here are five ways you can use your communications gear to garner and husband wealth.

- Looking for a mutual fund that really shines? Prodigy's Strategic Investor lights your way to the stars, calculating the rate of return on more than 2500 funds for periods ranging from one month to ten years. It also ranks them by performance.

COMPUTE Magazine's Power Tips

- Thinking about dumping those shares you inherited from Aunt Minnie? Dow Jones News/Retrieval's Corporate Ownership Watch (//WATCH) tells you what's hot and what's not. The database of Securities and Exchange Commission filings tells you who's snapping up big blocks of stock and whether company insiders are buying or selling.
- Remember reading something about a company, but can't remember where? DJN/R's Dowquest (//DOWQUEST) database has articles from national publications like the *Wall Street Journal*, *Barron's*, *Money*, and *Time*, plus selected useful articles from more than 150 regional business publications nationwide.
- In the market for a CD? Find out where interest rates are headed by reading "FEDWATCH," a weekly newsletter put out by MMS International's crack team of market analysts. The online report zeros in on Federal Reserve policy and interest rate trends (GO MMS on CompuServe).
- Want to know more about what the experts think? Get the latest scoop on more than 5,000 U.S. and foreign companies with more than 50,000 full-text research reports from DJN/R's Investext (//INVEST).

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Wealth and Taxes

Top Tax Software

For millions of Americans, April 15—Tax Day—is a day approached with dread. If you're like many last-minute taxpayers, you'll spend one long, sleepless night rummaging through a stack of old receipts, bank statements, and check stubs. Then, scribbling some numbers on your coffee-stained tax return, you'll dash off to the post office just before midnight—offering up a prayer to the patron saint of Lost Taxpayer Causes as you slip the envelope through the slot. Or maybe you'll simply throw up your hands and dump the whole mess on the lap of the nearest C.P.A., paying dearly for your procrastination.

There is a better way, and if you have a computer, you're already way ahead of the game. If you use tax-preparation software, you'll probably end up spending far less than the \$50 an hour charged by many C.P.A.'s, who often use professional versions of the same software that you can go out and buy yourself.

Now that prices are coming down and programs are getting friendlier, you owe it to yourself to give tax-preparation software a try. If you do, you'll be in good company. Dataquest, the San Jose market research firm, estimates

that over three-quarters of a million personal tax packages were sold in 1990.

"It's one of the fastest growing software categories around," says Gladys Francis, a Dataquest information analyst. "If you know how to use a personal computer, you can probably use tax-preparation software."

Once merely glorified spreadsheets, tax-preparation programs now do virtually everything except root through your shoeboxes and sign your name at the bottom of the return. These days just about all of the top-selling programs—TurboTax, TaxCut, MacInTax, Personal Tax Edge, and others—feature IRS instructions online, taxpayer interviews, pop-up help, onscreen calculators, almost every IRS form you'll ever need, and the ability to import data files from programs like Quicken and Managing Your Money. Upgrades for the 1992 tax season have improved on these features to make them better, faster, and even friendlier.

"We have turned from form preparers to tax advisers," says Anne Rawland, director of corporate communications at Parsons Technology, which sells Personal Tax Edge. "We're both a form provider and a simplified H&R Block at the same time."

Andrew Tobias, the popular financial writer who lends his name and expertise to MECA Software's TaxCut, says he uses the tax-preparation software to do his own taxes, his friends', and even his mother's.

"If you're rich and you hate this kind of thing, you can take everything over to your accountant and pay \$2,000 and not worry about it," Tobias says. Tax software, on the other hand, is inexpensive and "ready when you are, and you don't have to leave messages with the secretary."

Even the U.S. government, often maddeningly slow to embrace change, favors the growing trend toward taxpayers using PCs to fill out their own returns. "We don't have any problem with it as long as it results in an accurate return," says an IRS spokesman in Washington, D.C. In the not-too-distant future, he predicts, home computer users will be able to send their returns to the IRS via modem.

Despite the many pluses, however, tax software isn't for everybody. If you don't do your own taxes now and wouldn't know a 1040 if you tripped over one, you may be better off continuing with your accountant. Likewise, if your taxes involve passive losses, home office deductions, or anything else that's likely to trigger an IRS audit, then a C.P.A. may be your best bet.

Fortunately, when it comes to shopping for tax software, it's hard to go wrong. Since the market is so competitive, once one company unveils a new

bell or whistle, it isn't long before everybody else builds in that feature, too. And even though the market for tax software has undergone a good deal of consolidation over the last few years, price competition remains fierce.

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Which Tax Software?

Here's how the Big Three of the tax-preparation software field break down:

- **TurboTax and MacInTax:** The most popular program by far, ChipSoft's TurboTax offers versions not just for Joe Taxpayer but for C.P.A.'s and tax preparers, too. TurboTax's latest version features 11 new forms and work sheets, toll-free technical support, quicker data entry, a smoother interface with Quicken, a Windows version, and a final review feature that checks over your tax return after you're done. Now that ChipSoft has bought out Softview, the developer of MacInTax (the leading Macintosh tax program), TurboTax for the Mac has been discontinued, and many of its best features have been grafted onto MacInTax.
- **Andrew Tobias' TaxCut 1040:** The up-and-coming number 2 of the tax-preparation market, TaxCut owes a lot to a program released several years ago called Ask Dan About Your Taxes. Massachusetts tax lawyer Daniel Caine continues to refine the software as president of Legal Knowledge Systems, while MECA Software (marketer of Andrew Tobias' other software programs) distributes it. The program's strong points are its ease of use, especially for tax novices, and Caine's expert advice that's sprinkled throughout. This year's program includes a soup-to-nuts taxpayer interview, a Windows version to be released in January, and TaxCut EZ/A, a "baby TaxCut" for short-form users. If you discover along the way that you really need the long form, you can always upgrade to the regular TaxCut.
- **Personal Tax Edge:** The nation's third-ranked program in user popularity, Parsons' tax software has long been a low-price leader. The \$49 package packs in everything the big boys do—depreciation calculator, audit warnings, what-if estimator, taxpayer interview, the works—in addition to free, unlimited technical support by phone. Tax Edge's object-oriented capabilities, added in 1990, let you open the Schedule C file, for example, at the same time you're working away on your 1040.

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Features to Look For

No matter which tax program you decide to buy, make sure it includes these helpful features:

- **Taxpayer interview:** A series of step-by-step questions can help guide you through the maze of forms and schedules you'll need to file. This year's TaxCut, for example, starts out by asking you such questions as "Do you want to file jointly?" and then suggesting some reasons to consider doing that. TaxCut even prompts you to enter your name, occupation, and Social Security number.
- **Forms and schedules:** Besides the basic 1040, most top-selling programs include dozens of approved IRS forms for everything from deductible business expenses to depreciation of rental property. Make sure the program you buy has the forms you need.
- **IRS instructions:** Unless you get your kicks from wading through a pile of IRS brochures, you'll want a program that has the official IRS instructions online.
- **Electronic filing:** If you think you're due a refund, get a program that lets you file your return via modem. The reason? You'll get your refund check a lot faster. Many programs let you electronically send your completed form to a third-party service which, in turn, transmits your return to the IRS computers. (There is an additional fee for this.)
- **What-if tax planning:** You can plot this year's tax strategy and get a head start on 1993 with programs that let you make projections. You can calculate how fast your home business will grow, for example, or whether you can save money if you and your spouse file separately.
- **Onscreen tools:** Pop-up calculators and scratch pads mean you don't have to waste time rooting through piles of paper to find your pencil.
- **Financial data support:** If you've used a program like Quicken to track your expenses all year, there's no reason to type everything in again from scratch.
- **Technical support:** If you're a member of CompuServe or GENie, you'll welcome the chance to get your questions answered online. Most companies also offer help via phone and fax, though that can get expensive.

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Getting Information from the Home Office

The day of the virtual home office—where you have everything at your electronic fingertips—has already dawned. You can reach out and touch every resource you need from the comfort and convenience of your home office.

You can even draw from the information well without setting foot inside a library. One way, of course, is to hit the wires and telecommute to any of several excellent commercial databases on online services and bulletin boards.

Another way to get the business information you need, one that compresses entire shelves of in-office reference material to a handful of plastic discs, is CD-ROM technology.

CD-ROMs use the same CD technology that has revolutionized the music business. Tiny pits and peaks are set in plastic to represent digital data. A low-powered laser reads these highs and lows and then re-creates the original music, image, or text. A CD-ROM opens up vast expanses of storage space—enough to fill about 1500 floppy disks. You can cram hundreds of books onto one platter slightly smaller than a 45-rpm record.

But CD-ROM development suffered from a computing Catch-22: Without a broad selection of usable discs, few people had reason to buy a drive. But without lots of drives on desktops and in PCs, disc publishers had little reason to produce software. Recently, however, drive prices have fallen from the stratosphere, and producers have seen a ready market for their wares.

It's not difficult to assemble a working CD-ROM reference library that replaces several feet of space once reserved for dictionary, encyclopedia, atlas, and thesaurus. Even more specific CD-ROMs can turn you into a direct-mail marketer or a telemarketing phenom.

Gregg Keizer

Continents of Data

CD-ROMS for Basic Reference

CD-ROMs let you search through volumes of information in less time than it now takes you to grab a book.

Microsoft Bookshelf should be at the front of your home office CD-ROM archives. Available in both DOS and Windows (multimedia) formats, Bookshelf is an excellent general reference starter kit. You get *The American Heritage Dictionary*, *Bartlett's Familiar Quotations*, *Concise Columbia Encyclopedia*, *Concise Columbia Dictionary of Quotations*, *Hammond World Atlas* (Windows version

only), *Roget's Thesaurus*, and *The World Almanac*.

The multimedia version of Bookshelf uses animation, music, and speech to bring these references alive, something that you can forgo if you're using them exclusively for the office. You'll find that others in the family, especially kids, will think the spoken word pronunciations, digitally recorded national anthems, and animated illustrations for articles are great, though.

If you're strapped for cash, go for The Software Toolworks Reference Library, a collection that costs \$50 less than Bookshelf. It, too, includes a dictionary, thesaurus, and quotations, and it tosses in several other useful works—an address and phone directory and New York Public Library Desk Reference stand out—but it lacks an atlas and encyclopedia.

No matter what general collection you start with, a full-length encyclopedia should be next on your home office CD-ROM list. The New Grolier Electronic Encyclopedia, number one on the Bureau of Electronic Publishing's bestseller chart, is a multimedia production with such minimal hardware requirements—only 512K and a floppy drive—that it's perfect for the low-powered home office. Sound, speech, and music add to the reference, but it's the text itself—identical to *Academic American Encyclopedia* you find on the online services—and an attractive price that makes this worthwhile. Your other pick, Compton's Multimedia Encyclopedia is a more thorough reference.

Gregg Keizer
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Specialized CD-ROMs

Once you have the essential references at your fingertips, you can move on to more specific CD-ROMs that meet the needs of your own business.

The process of finding new clients and then organizing a direct-mail campaign means you'll burn the midnight oil. You can hit the local yellow pages, but that only gives you nearby businesses. Or you can slip American Business Information's Business Lists-On-Disc into your CD-ROM drive. This collection of over 9 million businesses, culled from over 5000 telephone directories, lets you search for clients by everything from city or ZIP code to company size or the type of business.

And you pay only for the names you use. Business Lists-On-Disc includes a key counter that you stick into your PC's parallel port. You can download, print, or autodial up to 1000 names before that counter empties; you buy additional lots of 1000 names at 12 cents per name. Obviously, it's most economical when you download lists to your PC—that way you can

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reuse the list as many times as you want.

If you work in the computer business, you need Ziff-Davis's Computer Select, a full-text collection of 50 computer magazines. Hundreds of other publications toss in article abstracts (short summaries), which are less valuable. For computer consultants, freelance writers, and mail-order merchants of software or hardware, Computer Select is a paper-free way to keep up with the industry. You can search through the hogpile of text by any combination, from company name or product to your own string of words. Computer Select isn't inexpensive at nearly \$1,000 per year, but the perks include monthly CD updates.

Where can you get good CD-ROMs? Check out your regular mail-order suppliers. Many are going into CD-ROM in a big way. Also look into specialty houses like PC CompoNet, which has regular specials on reference CD-ROMs.

CD-ROMs in the home office provide instant access to library-sized chunks of information, as if you had a slew of databases in your home.

Gregg Keizer

Continents of Data

Ten Ways to Make CD-ROMs Pay

Sure they're economical, space-saving, and packed with data. But that's just the beginning. You can make money with a system based on CD-ROM.

1. Target a direct-marketing campaign—nationwide or local—with the help of Business Lists-On-Disc's 9 million names and addresses.
2. Keep your computer consulting business up-to-date with a year's subscription to Computer Select, a database of hundreds of articles from nearly all the nation's PC-related publications.
3. Translate documents with the help of Languages of the World, a collection of 18 dictionaries in a dozen languages from around the world, including English, Japanese, Chinese, Dutch, French, Spanish, German, and Italian.
4. Stay in your office (and stay productive) rather than going to the library—once you have something like Facts on File World News Digest, a CD-ROM with thousands of clippings from the last ten years.
5. Feed your business-consulting clients news on the competition when you stick the Wall Street Journal Ondisc into your CD-ROM drive.
6. Split the cost of your home office's basic reference library with the family and forget about buying a paper encyclopedia.

7. Plan a marketing campaign for your client by digging into the volumes of Dun & Bradstreet business information on MarketPlace Business.
8. Track weather trends near your farm or outdoor business with the World Weather Disc, a collection of 17 databases culled from the National Climate Data Center and the National Center for Atmospheric Research (\$249).
9. Blow the doors off your desktop publishing competition with Type Gallery PS, a CD-ROM that holds the entire Adobe PostScript font library. You can access three of the 470 fonts; after that, you pay only for the ones you want by calling a toll-free number and giving a credit card number. Font families cost \$25 and up.
10. Improve your research-on-demand productivity with Reader's Guide to Periodical Literature.

Gregg Keizer
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Four Steps to a Data Diet

Wading through the Information Age takes time and, unfortunately for anyone not hooked up to a corporate budget, too much money.

You might be able to skimp on paper clips, even pens, by hitting the office discount stores. But information is never discounted.

One of the best data sources for the home and home office computer user is CompuServe, the monolithic online service. Forget about the scads of shareware software and the fragmented special interest groups—though both are places of unparalleled information—and head directly to the reference section on CompuServe by typing GO REFERENCE.

It's here that you can search through the back issues of several hundred publications or hit more specialized databases like Medline, the medical profession's information collection. Ringing up online research charges is all too easy, though. You need some money-saving strategies.

- Know what you're after. Before you trip the online meter, plan your quest for information. Narrow the search by focusing your efforts and cut down online time. If you're casting your data net for information on Pan Am's financial crises, for instance, use a keyword search like PAN AM & FINANCIAL.
- Know where to look. CompuServe keeps online copy from 48 newspapers—a much better resource on breaking information than magazines,

which labor under a two- to three-month lag time. Some papers are better than others. The *San Jose Mercury News*, for example, excels at technology reporting. Turn first to the *Washington Post* for news on government shenanigans.

- Know what it's going to cost. Balance the need for immediate information against the price you'll pay. Even the slickest searches—where you quickly find what you're looking for—rarely run less than \$5. A ten-minute look-see at three newspaper articles rings up as \$14.
- Know when to quit. Don't flog a dead horse. If you come up empty handed after a search and one alternate, drop it. Although you may want to continue—at any cost—just to get that one tidbit of information, resist the temptation. You can spend staggering amounts if you're not careful. Reconsider your need for the information, or head for the local library.

Apply these tactics to any information quest—they're general enough to work anywhere—and you're guaranteed to spend less time—and less money.

Gregg Keizer

Access and Security

How to Hold onto Data

With all the hazards to your information and the high price you pay for it, you have to put a high value on the data you accumulate. Here are just a few ways to make the world safer for your files.

1. Buy a tape backup drive if your PC's hard drive is larger than 40MB. You're much more likely to back up your data—and ensure its survival—if you can simply stick a tape in the drive and sit back, rather than feed floppies to the computer for an hour or two.
2. If you can't afford a tape backup drive, go ahead and back up to floppies using Fastback or some other backup utility. But back up only your document, file, and work directories—forget about the applications. Re-creating the entire hard disk will be a headache (when isn't it?), but you can always reinstall applications and games.
3. At home, lock up your PC to keep unwanted hands off the machine. Some PCs include a literal lock—just pocket the key. For those that don't, consider something like MenuWorks Advanced, which demands a password before it lets you get to the computer's contents.
4. Viruses are vastly overrated—for now. But some particularly nasty bugs

- may migrate from Europe, where they're raising Cain. Do what you can by using an antivirus package like Virucide.
5. Taking work home? Why not take the hard drive with you? Removable hard drives or cartridge drives at both locations let you take the entire contents of your drive with you, wherever you work.
 6. Encrypt sensitive files. PC Tools 7.1 lets you scramble data files—even directories—and then decode them only with the right password.
 7. Those people hanging around the fax machine know your business before you do. Invest in a fax board for your office PC—Intel's SatisFAXtion is relatively foolproof—and receive faxes at your desktop rather than at the communal information trough.
 8. If you compute remotely from the road with your home or office PC, secure the host by using passwords, restricted calling lists, or any other security features the remote software offers.
 9. Walk around with your computing world under your arm. A notebook computer is never more than a briefcase lock away. At home or the office, you can quickly connect it to an adult-sized monitor and keyboard for door-to-door security.
 10. The paperless office is a myth. Play like the CIA and shred sensitive documents and printouts. A personal paper shredder that fits over the top of a wastebasket costs less than \$200.

Gregg Keizer
Access and Security

Keeping Information Confidential

What can you do about it? Plenty.

- Never send something you wouldn't have the nerve to say. It's easy to let your emotions run rampant when you can hide behind the impersonal nature of E-mail. If you wouldn't dare say something to someone face to face or on the phone, why say it in a form that's far more permanent?
- Assume that someone is listening. Online and E-mail services promise privacy. Still, if you're sending sensitive information, don't take risks. While the transmitting service may not eavesdrop, it's possible that critical information transmitted via computer could fall into the wrong hands once it reaches its destination.
- Request a receipt. Most E-mail services—MCI Mail and CompuServe, for

instance—will, on request, send you a receipt when your message is received and read. Note the time and date the message was read—it's your proof that the message arrived, and it documents who read it.

- Protect your password. Guard any E-mail passwords carefully and change them frequently. If someone uncovers your password and account information, they can assume your electronic identity. That's asking for trouble.
- Consider extraordinary precautions. In some situations, you may not want to transmit "in the clear." For the ultimate in security, put the information in a file, encrypt that file with a data-security program, and then send it.

From the common sense to the clandestine, these E-mail security techniques could save you from embarrassment or even save your job.

Gregg Keizer

Access and Security

Help with Hardware

One of the secrets to getting the most out of your hardware is to take advantage of support services offered by vendors. Although many vendors provide phone numbers that you can call for information, it can be difficult to get a straight answer by telephone. Fortunately, there are alternatives.

The bulletin board systems operated by many hardware and software manufacturers can be a real gold mine for anyone who has a modem. On these systems, you'll usually find the latest information about a product, as well as notices about bug fixes, workarounds, and upgrades.

Not long ago I purchased a new Super VGA adapter. I ordered it from a supplier who bought it from a distributor who got it from who knows where. Although my supplier tries to keep up-to-date, I know he doesn't always have the latest information on every piece of equipment he sells.

So after I installed the video board, I called the manufacturer's BBS and checked out the message base and the files available for downloading. I discovered that the ROM for the board recently had been upgraded, giving the board additional capabilities.

When I tested my board, I found that I had the old ROM and called the company about getting an update. There was nothing to it. I gave the receptionist my name and address, and three days later I had the new chip. It took a little work, but in the end I received all the capability I'd paid for. If I hadn't investigated, I might never have learned about the upgrade.

In addition to picking up the news about the new BIOS chip, I also lo-

cated a couple of interesting video utilities that demonstrated the capabilities of my new board.

Many manufacturers have forums on GENie and CompuServe in addition to separate company-based bulletin boards. These forums are great places to discover whether or not anyone else has already unscrambled the problem that's vexing you.

Don't overlook these BBS systems as a way to get the most out of your equipment. In many cases, these systems are maintained by the programmers and designers who created the products you're asking about. What better source of information could there be?

Manufacturers also can be of assistance in helping you reclaim castoff parts. Many offices accumulate boxes of memory boards, modems, and input/output cards that have become separated from their documentation. These mystery boards could be of value if only someone knew how to set the dip switches and jumpers. With a little detective work, you may be able to enhance your system with some of these rejects.

First try to determine whether the hardware is in the junk box because it doesn't work (is it burned, broken, or missing chips?) or because no one knows how to make it work.

If you find a board that appears to be in good shape, check its markings for either the name or initials of the manufacturer. Sometimes these will appear as part of a copyright notice. Also, make note of the board's serial number, and if it has a revision number, make note of it, too.

Next, determine exactly how you want to use the hardware. In the case of an I/O card you might want to configure its parallel port as LPT2 and its serial port as COM3. Dig up the phone number of the manufacturer and place a call to technical support.

If you have good information on the board's markings and serial number and if you know exactly how you want to use it, chances are you can get the help you need to return the board to service. Also, ask technical support how you can get a copy of the pertinent documentation so you can change the configuration again later if necessary.

Unfortunately, this mystery hardware is all over the place. In some cases, documentation for these boards was lost or thrown out; but in many cases, documentation was never provided. Some vendors fail to give you the booklet for the video adapter, the internal modem, or the I/O card when they build a system for you.

Perhaps they assume that if you get the system home and it works, you'll be happy forever. Sorry, but that doesn't suit me. Computer boards are modu-

lar—designed for mix and match—and in an office environment there's value in moving hardware to the station where it'll do the most good.

In addition, more and more homes are housing multiple computers, and being able to swap components is essential. You may want to let your children use an older system for their schoolwork and gameplay, but you may want to keep that system's I/O card for your new computer. Without the documentation, you have a problem. If you have easy access to the switch and jumper settings, reconfiguration is pretty simple.

Keep this in mind as you shop for computers and demand adequate documentation for every component you purchase. I've had computer dealers tell me I didn't need any documentation. My reply has been that I may not need it, but I want it because I might need it later on.

Tony Roberts

IntroDOS

Computers and Speed

It seems like only yesterday that computer mavens were oohing and aahing over the wonders of the IBM PC and computerizing their bookkeeping as easy as 1-2-3. Now we have more power, speed, and applications on the desktop than we could've imagined, and the original IBM PC crawls compared to today's speed demons.

The microprocessor may be the "brains" of a computer, but it takes more than brains to move and manipulate information. That's why computers with identical microprocessors can turn in quite different performances. Lesson: It pays to understand how the parts of a computer affect overall performance.

A hard drive, for example, can affect performance in a dramatic way. Slow read/write access times can keep an otherwise speedy computer from working up to its full potential. That's why the industry offers all kinds of ways to keep the drive from slowing down the flow of information. For example, optimization software reorganizes disk information into contiguous areas so that the read/write heads don't waste time searching out the contents of a file, and disk caches hold the most frequently accessed information in memory so that you avoid accessing the disk more often than is necessary.

RAM speed can also affect performance; that's why you often find the speed of the RAM listed among the system specs. Static RAM offers a faster cache than the more conventional DRAM. If you run Windows, you should find that extra RAM speeds your applications along.

Mike Hudnall

Test Lab

Chapter 8

Programming Power

COMPUTE has always prided itself on the program listings that can be found in its pages, from the very first issue almost 15 years ago. In this chapter you'll find useful programs and utilities that allow you to make your computer use and your own programming more effective.

Just a few examples from this chapter will allow you to

- Create a Windows button and respond to it
- Write banners with huge letters on the screen
- Provide help for all your batch files
- Echo a blank line to the screen
- Get keyboard input for your batch files
- Send form feeds and linefeeds to your printer
- Check out your connections

Turbo Pascal for Windows: First Steps

I think Turbo Pascal for Windows is the best Windows development system available for its price, especially if you're a Pascal programmer.

Just be sure to budget something extra for CompuServe and a third-party book because the Turbo manuals don't do a great job of turning the new user

into a Windows programmer. One way to remedy that situation is to buy Tom Swan's *Turbo Pascal for Windows 3*, which costs \$29.95 from Bantam Books and is more than worth its price.

The only thing I don't like about Turbo Pascal for Windows is the documentation, which is pretty amazing considering it's a 1.0 product. There's a great deal to like about Turbo Pascal for Windows.

First of all, its price makes it simply the best deal you can find for developing Windows applications and DLLs. Make no mistake about it; your hundred clams (and that's list!) for Turbo Pascal for Windows, plus 30 for the Swan book, gets more bang for the buck than anything else out there by a margin of at least \$150.

Second, and more important, this set of robust, mature development tools is second to none. The debugger is a text-mode version of Turbo Debugger, not the more modestly endowed debugger that comes with Turbo Pascal 6 for DOS. The resource editor, which lets you create Windows dialogs, menus, and other user-interface gizmos, is Whitewater's well-respected Resource Toolkit, which itself sells for several times more than the entire Turbo Pascal for Windows package. The sample programs, in what is becoming a tradition with Borland, are numerous and of very high quality, illustrating just about every concept a Windows programmer needs to find illustrated.

The ObjectWindows Library is a sheath over Windows to ease the considerable bookwork required to get started in Windows programming, and it does a good job of it. A Help compiler is also included free (\$49.95 if you buy it from Microsoft); it lets you create true Microsoft Help for your applications. Last but not least, the multiwindow development environment and editor work together in inimitable Turbo Pascal fashion, which means that Turbo Pascal for Windows is intuitive and very, very fast.

We'll take those marvelous tools and create...well, we'll create a program that does very little. It merely displays a dialog with a couple of buttons on it. Normally I scorn do-nothing programs of this type, but I wish I'd had a template like it when I was creating my first real Windows application with Turbo Pascal.

The Turbo Pascal for Windows example programs are all quite sophisticated—too much so for a laggard like me. What I needed to know was the bare minimum required to put up a modeless dialog with a few buttons on it and how to connect the visual entity that is a dialog with the code it's supposed to execute. You should read the Turbo Pascal for Windows tutorial manual, which will make more sense after you peruse this column.

Following are the general steps. Create a dialog using some sort of re-

source editor or the mysterious RC (a familiar sight to old Windows hacks). The controls on the dialog must have numeric identifiers, and your program must know what those identifiers are. When the controls are activated (for example, when you click on a button), Windows sends a message to the Turbo Pascal application, which routes it through OWL. You must create a method for that control, giving the method a virtual index containing the value of the control's identifier. This means that every button, scroll bar, edit box, menu item, and so forth can potentially have a method associated with it. It also means that the routines for each button on the dialog can be in widely disparate areas in the source and that there is no intrinsic connection between the code for these controls and the fact that they appear on the same dialog.

This, then, is why Windows programs tend to be modeless and are so much easier to write in a way that keeps modes to a minimum. The user manipulates a physical object on the screen, and that action triggers code somewhere. Your program consists of little more than subprograms (methods, technically) whose sole purpose is to react to those actions.

Tom Campbell
Programming Power

Button Basics

The program below uses a simple dialog with two buttons. Clicking on one button causes a message to be displayed. Clicking on the other causes the program to end. While you could simulate this with the Windows MessageBox routine—it is in fact used by this program—you would be limited to the MessageBox's own resources. You can easily extend the concepts used to create this dialog to edit fields, other buttons, whatever. My file finder program illustrates several of these concepts. But let's get down to specific steps.

Fire up the Whitewater Resource Toolkit. Click on the New button and enter DLG as the filename. Click on the Dialog button. The default dialog type is perfect for our purposes. You may want to double-click on the dialog and change its caption for practice; I suggest the text Click on Done to Quit for reasons that will become apparent.

Click on the Button tool and add a button. Double-click on the button to bring up its Attributes dialog. Change the text to Test (don't ever accuse me of dazzling originality) and the item ID to 102. Repeat this for a second button, but name it Done and give it the button ID 103. Place the two buttons next to each other on the dialog. Name the dialog DIALOG1.

Save this dialog resource as DLG1.RES; then start Turbo Pascal for Win-

dows and compile the following program. Be certain all identifiers and numbers are correct because they're needed inside the source. When you run it, a dialog with two buttons appears. Click on Test, and a message box acknowledging your action appears. Click on Done, and the OWL CloseWindow method is called, returning the program's resources to Windows and exiting.

The program contains extensive comments showing you how to hollow it out and replace its code with your own. It's quite simple; the code is about 30 lines long. Use it in conjunction with chapter 11 of the Turbo Pascal for Windows Cookbook, and you'll be well on your way to building your own programs with custom dialogs.

```
PROGRAM DLG1;           { Compile using Turbo Pascal for Windows. }
{ DLG1 is a minimal program that simply puts up a dialog box with two
  buttons on it. It puts up a message box when the user clicks "Test,"
  and quits when the user clicks "Done." }
```

```
{ Adapting it for use in your own program:
```

- Change the copyright message in the \$D directive below.
- Change ResourceName to an appropriate identifier. This has to match the name of the identifier in the .RES file.
- If the name of a button, such as the Test button, is changed (very likely) change the id_Test identifier as well. Also, ensure that the button's ID number, 102, matches the ID number given to it in the resource editor.

```
To add buttons:
```

- Add them to the dialog resource using the resource editor.
- Make sure they have distinct IDs (the resource editor assigns unique IDs automatically, but you can change them—so be careful).
- Add CONST declarations with identifiers using the same names as the buttons, but prefixed with "id_". For example, if a button called "Done" is given the resource ID 103 in the resource editor, use this declaration in your program file:

```
CONST
  id_Done = 103;
}
```

```
{ Use the OWL units. }
```

```

USES WinTypes, WinProcs, WObjects;

{ Link in the resource file DLG1.RES. }
{$R DLG1 }

{ This gets inserted directly into the .EXE. }
{$D Copyright (c) 1991 by Your Name Here }

CONST
  { Symbolic name of the dialog resource. This must match the "Dialog ID"
    you assign the dialog object in the resource editor. }
  ResourceName : PChar = 'DIALOG1';

  { This matches the resource ID number of the "TEST" button. }
  id_Test = 102;
  { This matches the resource ID number of the "DONE" button. }
  id_Done = 103;

TYPE
  TMyApplication = object(TApplication)
    { Your application must override (have its own) InitMainWindow method. }
    PROCEDURE InitMainWindow; virtual;
  END;

  { Points to objects of type TDialog1. Pointers of this type will
    be used to allocate TDialog1 objects dynamically. }
  PD1 = ^TDialog1;

  { This data structure matches the dialog resource 'EMPTY1' in DLG3.RES. }
  TDialog1 = OBJECT(TDialog)
    { Executes when the button with ID #102 (id_Test) is clicked. }
    PROCEDURE TestButtonProc(VAR Msg : TMessage);
      VIRTUAL id_First + id_Test;

    { Executes when the button with ID #103 (id_Done) is clicked. }
    PROCEDURE DoneButtonProc(VAR Msg : TMessage);
      VIRTUAL id_First + id_Done;
    END;

```

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```
{ Note that the VIRTUAL cm_First + id_Test isn't in the
declaration. It appears only in the TYPE or OBJECT definition. }
PROCEDURE TDialog1.TestButtonProc(VAR Msg : TMessage);
BEGIN
  { Just put up this message when the Test button is clicked. }
  MessageBox(HWindow, 'You clicked the Test button!',
    'Testing dialogs', mb_Ok);
END;

{ Executes when the DONE button is pressed. }
PROCEDURE TDialog1.DoneButtonProc(VAR Msg : TMessage);
BEGIN
  { Deallocates and removes the dialog box. }
  Done;
END;

{ This procedure executes when the application's main window appears. }
PROCEDURE TMyApplication.InitMainWindow;
BEGIN
  { The only job of the main window is to put up a dialog of type PD1. }
  MainWindow := New(PD1, Init(NIL, ResourceName));
END;

VAR MyApp: TMyApplication;
BEGIN
  MyApp.Init('Application name');
  MyApp.Run;
  MyApp.Done;
END.
```

Tom Campbell
Programming Power

PC Character ROM Revealed

This program, banner.c, digs deep into the guts of your PC by using the character ROM to display letters eight times their normal size in text mode. It shows both an underused PC resource (the system font data) and some useful tricks of the C trade: bit-shifting operators, reading bit values, using array no-

tation for pointers, and reading absolute addresses on the PC.

Banner asks you for a string of up to ten characters and a fill character. The fill character is what makes up the dots in the letter—for example, the asterisk character or one of the extended ASCII box characters. You can enter the extended ASCII characters by holding down the Alt key and pressing up to three digits, creating a number between 0 and 255. I suggest 177, 178, 219, 248, and 254. Then Banner displays the string on the center row of your screen.

Your PC video card has an 8 x 8 character set in its ROM, even though, in the case of EGAs and better, that's not the default system font. But it's there all the time to provide compatibility with earlier adapters. The dots that make up the 8 x 8 font are found at location F000:FA6E hex and are laid out in 256 sets of eight bytes each, with the first byte making up the top row of dots in each letter, the second byte making up the second row of dots, and so on. The example below shows the layout of the letter A.

The first byte, numbered 0, contains the hex value 3Eh. This makes little sense until you view it as the binary value 01111100. Replace each of the 1s with an X, and you have the top line of the A. The next byte is hex C6h, or binary 11000110. You may notice that bit 0 is unoccupied for almost every character, as is byte 7. Bit 0 forms the space between letters—it's just an empty column formed by leaving bit 0 of each of the rows of bytes cleared to 0. An exception is the underline character, which, appropriately, goes all the way across the character matrix. And byte 7 is the space left for descenders the tails for g, j, p, q, and y.

Bit	7	6	5	4	3	2	1	0	Byte
									0
									1
									2
									3
									4
									5
									6
									7

The chart above isn't quite accurate. The byte numbered 0 is actually byte 520. Remember that the uppercase A is ASCII 65. There are eight bytes of data per character. Multiply 65 by 8, and you get 520. Uppercase B is at 528, and C is 536. The formula, then, as it appears in the WriteChar() routine, is Char-

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`acterRom = CharacterRom + Letter * 8.`

CharacterRom was previously initialized and allocated at the same time—another handy C trick: `char far *CharacterRom = (void *) 0xF000FA6E.` This is identical to `char far *CharacterRom; ... CharacterRom = (void *) 0xF000FA6E.`

The previous example is clearer in this case, because we want to emphasize the nature of CharacterRom as an absolute address. The easy part is explaining that 0xF000FA6E is hex notation for the absolute address whose segment:offset value is, as explained earlier, F000:FA6E. That's where the 1024 bytes of character ROM data appear. Let's dissect the rest of the line piece by piece, because much of it isn't what it seems. The `char` means that we will treat the address as a pointer to a character. Since a character is guaranteed by the ANSI standard to be the same size as a byte and since C lets us use array notation wherever we see a pointer, later we'll be able to calculate the location of each row of character data like this, even though CharacterRom wasn't declared as an array: `Bitmap = CharacterRom[EachRow].`

Let's use the top row of A, binary 01111100, as an example. The Binary numbers mirror the physical layout of bits in memory, so this loop starts at the left bit and moves right: `for (EachCol=7; EachCol >=0; EachCol—).`

The line "`if (Bitmap & 1)`" is another good example of C's terseness at work, taking advantage of C's treatment of an if expression as an integer result. In Pascal, you'd use this code: `IF (Bitmap AND 1) = 1 THEN.`

Using the bitwise AND operator of C to see whether a bit is set makes it easier to see what's going on. If the right-most bit of Bitmap is indeed set to 1, the cursor is positioned appropriately, and the FillChar is written directly to screen memory. If bit 0 is clear (that is, with a value of 0 instead of 1), nothing happens. Finally, the byte is pushed one bit to the right, moving bit 1 into the 0 position, 2 into the 1 position, and so on, up to bit 7.

With only a little extra work, you could beef up WriteChar() to center the text both vertically and horizontally.

```
/* BANNER.C — Compile using Turbo or Borland C
   Displays text onscreen in banner format. */
```

```
#include <conio.h>
#include <string.h>
#include <stdio.h>
```

```
/* Displays Letter magnified 8 times at Row, Column, using FillChar
```



```

    as the character to use for "pixels". */
void WriteChar(char Letter, int Row, int Column, int FillChar)
{
    /* Starting position in byte array of character data. */
    char Bitmap;

    /* Address of the ROM CGA character bitmap. */
    char far *CharacterRom = (void *) 0xF000FA6E;

    /* Loop counters used to read character data. */
    int EachRow, EachCol;

    /* Figure out the address of the char—each is 8 bits wide. */
    CharacterRom = CharacterRom + Letter * 8;

    /* Starting at the top row... */
    for (EachRow = 0 ; EachRow < 8 ; EachRow ++ ) {

        /* Fetch the next "row" of bits. */
        Bitmap = CharacterRom[EachRow];

        /* Starting at the highest bit, */
        for (EachCol = 7 ; EachCol >= 0 ; EachCol — ) {

            /* display the user-defined FillChar if the bit is set. */
            if (Bitmap & 1) {

                /* Position the cursor. */
                gotoxy(Column + EachCol, Row + EachRow);

                /* Write this value directly to screen memory. */
                putch(FillChar);

            } /* if Bitmap */

            /* Move a bit to the right. */
            Bitmap >>= 1;

        } /* for EachCol */
    }
}

```

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```
    } /* for EachRow */

} /* WriteChar() */

/* Displays a string with chars magnified, starting at Row, Column
   and using FillChar for the "pixel" values. */
void WriteStr(char *Msg, int Row, int Column, int FillChar)
{
    /* If we have not yet reached a 0 byte, */
    while(*Msg) {

        /* display the current character magnified,
           point at the next character in the input string, */
        WriteChar(*Msg++, Row, Column, FillChar);

        /* and move a letter to the right onscreen. */
        Column += 8;

    } /* while (*Msg) */
} /* WriteStr */

/* Driver program to demonstrate WriteStr() */
void main()
{
    /* Character used to draw magnified letter. */
    char FillChar;
    /* String to display (only draws 1st 10). */
    char TestString[80];

    clrscr();
    printf("Enter a string up to 10 letters: ");
    gets(TestString);

    /* Good values to try: 177, 178, 219, 248, 254 */
    printf("\nAnd a fill character (try holding down Alt and entering an ASCII
value): ");
    scanf("%c", &FillChar);
    clrscr();
```

```
WriteStr(TestString, 8, 1, FillChar);

} /* main() */
```

Tom Campbell
Programming Power

Bad Batch Memory?

Do you write batch files and then find yourself weeks, months, or years later wondering what they do or how to use them? The solution is to make each batch file self-documenting.

If the batch file uses a replaceable parameter, have the first line of your program test to see if the parameter has been supplied. If not, have the program go to an ECHO statement that explains how to run the program. The following example can serve as a template for your batch files.

```
if (%1)==() goto help
program line 1
program line 2
...
program line x
goto end
:help
echo Put instructions for using
echo program here. use as many lines
echo as you need.
:end
```

When you forget how to use a program, just run it without specifying the parameters, and you'll get the help you need.

Tony Roberts
Tips & Tools

Really Wild Cards

Sometimes you want to be able to use wildcard specifications on programs or DOS commands that don't support them. It might be convenient to enter the command type *.txt to read a directory full of text files. But it doesn't work

that way.

However, star.bat does that—and one better. It allows you to use lists of file specifications! For example, enter the command Star type *.txt *.bas test.c to run the Type command on all text files, all BASIC files, and the C program Test. The Star program does its magic with the sorely neglected For command in batch:

```
echo off
cls
rem Check for at least 2 parameters.
if "%1" == "" goto syntax
if "%2" == "" goto syntax
rem %1 is the command or program. everything else
rem is matched by the file specification.
for %%r in (%2 %3 %4 %5 %6 %7 %8 %9) do %1 %%r
goto bottom
:syntax
echo Need a program or command name and one or more
echo file specifications. For example:
echo star type *.doc
echo star qb s.bas timer.bas
:bottom
```

The heart of the program is its For loop. %1 is the name of the program or command. %2 through %9 are the command line parameters. Note that the program will quit if it doesn't find at least a pair of parameters: the program or command name, and at least one file specification. The %%r gets replaced by each file matching each file specification; in the TYPE example above, all files ending in txt are copied into %%r file by file in directory order.

You could improve this program even further by using a Shift. That would give you even more than the eight file specifications offered by this version of STAR, although I've never used more than three or four.

Tom Campbell
Tips & Tools

Blank Echo

Here is yet another look at echoing a blank line in a batch file. You can't just type Echo all by itself on a line, because you'll get a message like Echo is off.

Echo is a three-part command:

- With no arguments, it reports status: Echo is on, or Echo is off.
- With arguments on or off, it enables or disables command echoing.
- With any other argument, it just repeats back what you tell it: Echo Hello will just make the PC say Hello on the screen.

How, then, to create a blank line on the screen? There are three approaches. The first is to use the ansi.sys escape codes to move the cursor around, creating blank lines by skipping lines. It's too much work. And if ansi.sys wasn't loaded by the user's config.sys file, this approach won't work.

An easier way is just to use the Echo command with a period (.) after it. Try it out:

```
@echo off
echo The following is a blank line:
echo.
echo See?
```

(Editor's note: This technique may not work consistently in all versions of DOS.)

The third way is to hold down the Alt key and type 255 on the numeric keypad after the Echo command. This enters a blank character after the ECHO command, which will print to the screen.

Mark Minasi

Tips & Tools

The Straight and Narrow

Sometimes you need to employ DOS utilities in a batch file, but you can't ensure that they are available on the target machine. For example, this handy line displays a sorted directory:

```
dir | sort
```

However, it requires that sort.exe appear someplace on the path. If Exist won't do it, because in order to use it, you must know the full pathname of the file.

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For comes to the rescue, thanks to the fact that DOS treats the semicolon as a separator. Try this program twice. The first time, use the name of a program you know is on the path; for example, sort.exe. Next, try a name you know doesn't exist; for example, lunkhead.tmp. In both cases you should remember the extension; Sort won't work, but sort.exe will.

```
echo off
cls
if "%1" == "" goto end
set tmp=n
for %%f in (%path%) do if exist %%f\%1 set tmp=y
if %tmp% == y echo %1 is on the path.
if %tmp% == n echo %1 is not on the path.
set tmp=
:end
```

The set tmp=n line means "Make the value of the environment variable TMP the letter n." The n is short for "no," because we assume the file doesn't exist. (If you are already using tmp as an environment variable, use some other variable name in place of tmp in the example.) The next line is the heart of the program. The For loop searches the path directory by directory doing an If Exist search in each one. If the file is found, the value in tmp changes to y. You can now query this value anytime you want in the program. The program then displays the results of the search and removes the tmp environment variable, since it's no longer needed by your environment.

Tom Campbell

Tips & Tools

Batch File Keys

If you ever write a batch file and try to create even a simple menu, you'll be stuck, since you can't get a keypress from the user and then jump to the appropriate section in the batch file. Here's a way to create a com file that will wait for a keypress and return it to your batch file as an Errorlevel. The code that is returned is the ASCII code for the key that is pressed.

Make sure that the DOS program called Debug is in your path. Enter the following program script:

```
debug getkey.com
```

```
File not found
-e 100 2a e4 cd 16 b4 4c cd 21
-rcx
cx 0000
:8
-w
writing 0008 bytes
-q
```

This creates a program file called `getkey.com`. The following program returns all alpha characters in capitalized form.

```
debug allcaps.com
file not found
-e 100 2a e4 cd 16 3c 61 72 06 3c 7a 77 02 24 df b4
-e 110 cd 21
-rcx
cx 0000
:11
-w
writing 0011 bytes
-q
```

Here's a sample batch file that uses the `getkey.com` program.

```
echo off
:begin
cls
echo 1. Run QuickBASIC
echo 2. Run XyWrite
echo 3. Run Windows
echo 4. Quit batch file
:getthekey
getkey
if errorlevel 52 goto end
if errorlevel 51 goto Windows
if errorlevel 50 goto XyWrite
if errorlevel 49 goto BASIC
goto getthekey
```

```
:BASIC
qb45
goto begin
:XyWrite
editor
goto begin
:Windows
win
goto begin
:end
cls
```

Richard C. Leinecker
Tips & Tools

Mouseless QuickBASIC

Help screens: In QuickBASIC I discovered by accident that pressing the first letter of any hypertext link jumps the cursor to that topic. If several topics share a first letter, the cursor will cycle among them each time you press the letter key until you press Enter. And when looking at a QuickHelp or Details screen, Q and D toggle between those links.

Zoom: You can zoom any window using Ctrl-F10, which I often find more comfortable than clicking the zoom icon.

Opening files. Make short shrift of the Open dialog with Tab and the space bar. Press Tab to move to the file list and press the space bar to select a file. The space bar often works where Enter does in the QuickBASIC and Windows environments, especially for clicking push buttons.

Tom Campbell
Tips & Tools

Mouse Routines for C

Now that most computers have mice, you'd think mouse support would be universal. Far from it. But here's a set of routines that cover the basics you'll need for accessing the mouse from a C program.

Start by creating the following module containing the four routines you'll use. The mvector pointer that you see is a precaution for DOS 2.1 where the mouse vector is null, and calling the mouse interrupt will crash the system. If this pointer is any nonzero value, then it's safe to call the mouse interrupt. The mouse handler follows.


```

#include <dos.h>

int InitMouse( void );
void ShowMouse( void );
void HideMouse( void );
void GetMouse( int *, int *, int * );

/* Returns 0 for no mouse, nonzero if it finds an active mouse driver */
int InitMouse( void )
{
    long far *mvector;
    union REGS in, out;

    FP_SEG( mvector ) = 0x0000;
    FP_OFF( mvector ) = 0x00cc;

    if( *mvector ){
        in.x.ax = 0;
        int86( 0x33, &in, &out );
        return( out.x.ax );
    }
    else return( 0 );
}

void ShowMouse( void )
{
    long far *mvector;
    union REGS in, out;

    FP_SEG( mvector ) = 0x0000;
    FP_OFF( mvector ) = 0x00cc;

    if( *mvector ){
        in.x.ax = 1;
        int86( 0x33, &in, &out );
    }
}

```

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```
void HideMouse( void )
{
long far *mvector;
union REGS in, out;

    FP_SEG( mvector ) = 0x0000;
    FP_OFF( mvector ) = 0x00cc;
    if( *mvector ){
        in.x.ax = 2;
        int86( 0x33, &in, &out );
    }

}

void GetMouse( int *mx, int
               *my, int *button )
{
long far *mvector;
union REGS in, out;

    FP_SEG( mvector ) = 0x0000;
    FP_OFF( mvector ) = 0x00cc;

    if( *mvector ){
        in.x.ax = 3;
        in.x.bx = in.x.cx = in.x.dx = 0;
        int86( 0x33, &in, &out );
        *mx = out.x.cx;
        *my = out.x.dx;
        *button = out.x.bx;
    }

}
```

Using the routines is simple. Start your program by calling `InitMouse()`. If it returns a 0, there is no active mouse driver. Your program can still safely call all of the other mouse routines. They just won't do anything. If your program ever changes video modes, you should call `InitMouse()` again.

The mouse pointer is invisible until you call the `ShowMouse()` routine.

Make sure that every time you draw or print to the screen you first call `HideMouse()`, and then when you're done, call `ShowMouse()`. If you don't, your draw operations may overwrite the mouse, which can be very messy.

To find out where the mouse's position is, you need to call `GetMouse()`. You have to pass the address of three integers. The first is the x-coordinate, the second the y-coordinate, and the third the Button variable.

Here's an example that assumes you're linking in the above code.

```
#include <stdio.h>

int MouseFlag, Mx, My, Button;

void main( void )
{

    MouseFlag = InitMouse();
    ShowMouse();

    while( Button != 3 )
    {

        GetMouse( &Mx, &My, &Button );

        HideMouse();
        printf( "X:%d Y:%d\n",
            Button:%d\n",
            Mx, My, Button );
        ShowMouse();
    }
    HideMouse();
}
```

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Tips & Tools

Just the Dirs

If you want to use the DOS `Dir` command to see a list of directories, you're out of luck. One trick people use is `Dir *` to list all files without extensions. If

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you can remember never to give an extension to a subdirectory name and always give an extension to a filename, this trick will work fine. But this program will ignore files without extensions and will list subdirectories with extensions.

The program is called Dirdir, and it displays subdirectories located in the current directory.

```
debug dirdir.com
File not found
-e 100 b4 4e b9 10 00 ba 39 01 cd 21 72 29 ba 9e 00 be
-e 110 95 00 f6 04 10 74 18 2a c0 8b fa b1 0f f2 ae 4f
-e 120 c6 05 0d c6 45 01 0a c6 45 02 24 b4 09 cd 21 b4
-e 130 4f cd 21 73 dd b4 4c cd 21 2a 2e 2a 00
-rcx
cx 0000
:3d
-w
writing 003d bytes
-q
```

After creating this program, I put it in my DOS directory (which is in my path), and wherever I am, I can get a look at the subdirectories within the current directory.

Richard C. Leinecker

Tips & Tools

Change Border Color

This program changes the screen border color.

```
DEBUG BORDER.COM
File not found
-e 100 be 81 00 2b c9 2b db ac
-e 108 3c 20 74 fb 2c 30 3c 09
-e 110 77 0b 86 c3 b1 0a f6 e1
-e 118 03 d8 ac eb ef b8 01 10
-e 120 8a fb cd 10 b4 4c cd 21
-RCX
CX 0000
```

```
:28
-W
Writing 0028 bytes
-Q
```

To use the program, just type BORDER color. In place of color, type a number from 0 to 15. Check in your GW-BASIC or other BASIC manual for the color codes. If you use the DOS Cls command, it will reset the border to the default color. To get around this, you can create a batch file that first clears the screen and then sets the border color. Here's what my file called clear.bat looks like. It would help if the program were in your DOS directory or somewhere else in your path.

```
echo off
cls
border 4
```

Richard C. Leinecker
Tips & Tools

Send a Form Feed

The following program, ff.com sends a form feed to the printer to eject the current sheet of paper.

```
debug ff.com
File not found
-e 100 be 81 00 2b d2 ac 3c 20
-e 108 74 fb 2c 30 3c 09 77 0b
-e 110 86 c2 b1 0a f6 e1 03 d0
-e 118 ac eb ef b8 0c 00 cd 17
-e 120 b4 4c cd 21
-rcx
cx 0000
:24
-w
writing 0024 bytes
-q
```

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To use the program, just type FF printerport. It will send a form feed to the printer connected to the port you specify. Make sure the printer port has a value between 0 and 2. If you don't specify a printer port, it will output to printer port 0.

Richard C. Leinecker

Tips & Tools

Send a Linefeed

The following program sends a linefeed to the printer port specified.

```
debug lf.com
File not found
-e 100 be 81 00 2b d2 ac 3c 20
-e 108 74 fb 2c 30 3c 09 77 0b
-e 110 86 c2 b1 0a f6 e1 03 d0
-e 118 ac eb ef b8 0a 00 cd 17
-e 120 b4 4c cd 21
-r cx
cx 0000
:24
-w
writing 0024 bytes
-q
```

To use the program, just type LF printerport. It will send a linefeed to your printer. Make sure the printer port has a value between 0 and 2. If you don't specify a printer port, it will output to printer port 0.

Richard C. Leinecker

Tips & Tools

Find Out What Ports Are Available

The next program tells you what ports your computer has available to you.

```
debug ports.com
File not found
-e 100 e4 21 50 2a c0 e6 21 e4
```

```
-e 108 21 8a d8 be e8 01 2b c0
-e 110 8e c0 bf 00 04 b7 10 bd
-e 118 04 00 ba de 01 e8 5a 00
-e 120 bf 08 04 b7 80 bd 03 00
-e 128 ba e3 01 e8 4c 00 ba e8
-e 130 01 2b c0 8e c0 26 a1 cc
-e 138 00 26 0b 06 ce 00 0b c0
-e 140 74 29 2b c9 b8 24 00 cd
-e 148 33 0b c9 74 1e ba eb 01
-e 150 0a c9 74 14 80 c1 30 88
-e 158 0e f9 01 80 f9 34 74 06
-e 160 c6 06 f4 01 32 90 eb 03
-e 168 ba fb 01 b4 09 cd 21 ba
-e 170 e8 01 b4 09 cd 21 b4 4c
-e 178 cd 21 8b cd 26 83 3d 00
-e 180 74 42 53 8b da 8b c5 2b
-e 188 c1 04 31 88 47 03 5b b4
-e 190 09 cd 21 84 df 75 25 52
-e 198 ba d7 01 c6 06 dc 01 33
-e 1a0 90 f6 c1 01 75 06 c6 06
-e 1a8 dc 01 34 90 83 fd 03 75
-e 1b0 06 c6 06 dc 01 37 90 b4
-e 1b8 09 cd 21 5a 87 d6 b4 09
-e 1c0 cd 21 87 d6 83 c7 02 83
-e 1c8 fd 04 75 06 80 f7 18 e2
-e 1d0 ab c3 2a ff e2 a6 c3 2d
-e 1d8 49 52 51 20 33 24 43 4f
-e 1e0 4d 31 24 4c 50 54 31 24
-e 1e8 0d 0a 24 4d 6f 75 73 65
-e 1f0 20 43 4f 4d 31 2d 49 52
-e 1f8 51 34 24 50 53 2f 32 20
-e 200 4d 6f 75 73 65 24
-RCX
CX 0000
:106
-W
Writing 0106 bytes
-Q
```

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To use the program, just type ports. It will show you which serial and parallel ports are installed. It will also tell you which IRQs are assigned to each port. If you don't see an IRQ number after a port, there's no IRQ assigned to the port. Normally you'll see something like this:

COM1, IRQ4

But if there's no IRQ assigned to COM1, you'll see

COM1

The program also tells you what COM port and IRQ your mouse is on.

Richard C. Leinecker
Tips & Tools

Mondo Batch

Most people have dozens of batch files on their hard drives that make DOS easier for them. Some may log on to a directory, run an application, clear the screen, and then return to the root directory. Some may even be interactive and display menus. But each of these batch files occupies a cluster of storage space. That can be 2K or 4K, depending on the size of your hard drive. It's a shame to waste so much space for these small files.

There is a solution. Combine many of your batch files into one big file. Here's how.

Run a text editor or word processor in ASCII mode. I called mine bigbat.bat. Start the file like this.

```
echo off
if "%1"==" " goto syntax
shift
goto %0
```

The label SYNTAX will give instructions for using Bigbat in case no command line argument was given. If there was an argument, then the batch file will go to the label of the same name. For instance, if you typed Bigbat word, it would go to the label word. Here's the rest of Bigbat.

```
rem run XyWrite word processor.
```



```
:word
cd \xy
editor
cls
cd \
goto end
rem run Brief text editor.
:brief
cls
cd \brief
b
cls
goto end
rem run QuickBASIC.
:qb
cls
cd \qb45
qb
cls
cd \
goto end
rem delete the contents of disk in drive a without are you sure? prompt.
:killa
echo y del a:*. *
goto end
rem delete the contents of disk in drive b without are you sure? prompt.
:killb
echo y del b:*. *
goto end
rem read a file on the screen.
:readit
type %1 more
goto end
:syntax
echo to use bigbat, type
bigbat [label]
echo where label is the label
echo within the batch file you
echo want to execute.
```

:end

Richard C. Leinecker
Tips & Tools

High Scorer

The following routine creates an ASCII file that contains a list of the top ten scorers. When you enter the routine, you should have a variable called name\$ that contains the contestant's name and a variable called score that contains the contestant's score. This example program contains a short routine at the beginning that creates a name and a score so that each time it runs it updates the high-scorers list. You should delete these lines when you use the routine with your program. This program is written in Microsoft QuickBASIC but should be usable with most BASICs, since it doesn't do anything fancy.

```
DIM a(9)
leftmargin = 20
REM Take out this part. It's for demonstration purposes only,
REM to generate names and scores.
RANDOMIZE (VAL(MID$(TIME$, 7, 2)))
name$ = ""
FOR i = 0 TO 8: name$ = name$ + CHR$((RND * 25) + 65): NEXT
score = INT(RND * 5000)
REM End of demonstration lines.
score = 99999 - score
score$ = STR$(score)
score$ = RIGHT$(score$, LEN(score$) - 1)
score$ = RIGHT$("00000" + score$, 5)
IF LEN(name$) > 8 THEN name$ = LEFT$(name$, 8)
OPEN "highscor.txt" FOR APPEND AS #1
PRINT #1, score$, name$, DATE$
FOR i = 0 TO 9
PRINT #1, "99999"
NEXT
CLOSE #1
RESET
SHELL "type highscor.txt > tempscor.txt | sort"
SHELL "del highscor.txt"
```

```

OPEN "highscor.txt" FOR OUTPUT AS #2
OPEN "tempscor.txt" FOR INPUT AS #1
FOR i = 0 TO 9
  LINE INPUT #1, a$
  PRINT #2, a$
NEXT
CLOSE #1
CLOSE #2
SHELL "del tempscor.txt"
OPEN "highscor.txt" FOR INPUT AS #1
FOR i = 0 TO 9
  LINE INPUT #1, a$(i)
NEXT
CLOSE #1
CLS
PRINT SPC(leftmargin);
PRINT "-----HIGH SCORES-----"
FOR i = 0 TO 9
  IF LEFT$(a$(i), 5) <> "99999" THEN
    PRINT TAB(leftmargin); "";
    PRINT USING ("#####"); 99999-VAL(LEFT$(a$(i), 5));
    PRINT RIGHT$(a$(i), LEN(a$(i))-5);
    PRINT ""
  END IF
NEXT
PRINT SPC(leftmargin);
PRINT "-----"

```

Robert Bixby
Feedback

The Numbers

Enter this program using GW-BASIC or any compiled BASIC at your disposal.

```

10 DEF SEG = (0)
20 POKE 1047, (PEEK(1047) OR 32)
30 SYSTEM

```

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The last line should only be used with interpreted BASIC. Save the program as numon.bas (or compile it as numon.exe) and run it from the command line by typing gwbasic numon (or just numon, if you've compiled it) or put this command in your autoexec.bat file. This will turn on Num Lock. If you would like a program that toggles the Num Lock condition on or off, change the name to numtog.bas and change line 20 to poke 1047, (peek(1047) xor 32). If you want to turn Num Lock off, change the name to numkill.bas and line 20 to poke 1047, (peek(1047) and 223) which is 255-32. That's not the end of it, though. The Caps Lock key is operated by using

or 64
xor 64
and 191

Here's a diagram that tells you all the values you can use and the keys they affect.

	or/xor	and
Right Shift	1	254
Left Shift	2	253
Ctrl	4	251
Alt	8	247
Scroll Lock	16	239
Num Lock	32	223
Caps Lock	64	191
Insert	128	127

Robert Bixby
Feedback

Creative Use of BASIC's Data and Restore

While you take it for granted now, BASIC didn't always have the ability to read files. Hard to imagine BASIC without this crucial aspect of the language, but the first versions of Microsoft BASIC had to be squeezed into 4K. That's right—less than the minimum disk space required for any file on some high-capacity hard drives.

Data statements were added as a sop. For reasons we'll examine shortly, I rarely employ them in BASIC programs anymore, but my first excursion into

a higher-level language—and in 1984, Turbo Pascal was undeniably a higher-level language than GW-BASIC—left me amazed that there was no way to include data in a program. You can now use Turbo's strangely named typed constants to do roughly the same thing as data statements, but they were added years later as a response to C's initialized variables. I was depressed to realize that my only recourse was either to declare a bunch of variables at the top of a routine and initialize them manually at a later time or to use files.

A data statement is just a list of one or more values of a type recognized by BASIC. The read statement automatically assigns one of the values in the data statement to a variable, magically keeping track of both the line of the data statement and the datum being read. Then it moves efficiently on to the next datum the next time it's called, using an internal placeholder called the data pointer.

The program Play1 offers an example of data at work, as well as data's assistant, restore. Run it, and you'll hear a passable rendition of reveille, the familiar bugle call played by a lone, shivering enlisted man at dawn in countless war movies.

```
' Play1.bas—tested with
' PowerBASIC and QuickBASIC.
' Illustrates data and restore
' statements by playing reveille.
' the first part.
' Each call to playverse will read
' each nextline$ string and play
' it until a "" occurs.
call playverse
call playverse
' the second part.
' go back to the first data
' statement. play up to a "".
restore
call playverse
' skip down to the part 2 data
' statement, and play up to a "".
restore part2
call playverse
' the third part.
' simply continue playing part 3.
```

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```
call playverse
' this loop fetches the value of
' each data statement, copies it
' into the string variable
' nextline$, and plays it. when
' the variable is a null string,
' the subroutine exits.
sub playverse
do
read nextline$
play nextline$
loop until nextline$ = ""
end sub
' refrain—this is used several
' times by reveille.
data "p8 c32 p32 p16 f32 p16 l16 a f c32"
data "p16 c32 p32 p16 f32 p16 l16 a f c16"
data "p16 c32 p32 p16 f32 p16 l16 a f c16"
data ""

' part 1—this is used the first
' time through.
data "p16 l16 f p16 l4 a f8 p8"
data ""
' part 2—used the second time
' through.
part2: data "p16 c16 p16 l4 f"
data ""
' part 3—used as the third and
' last part of reveille.
data "ms p8 l8 a a a a l4 o5 c"
data "l8 o4 a f a f a f"
data "l8 a a a a l4 o5 c"
data "l8 o4 a f a f c c l4 f"
data ""
```

At the heart of play1.bas is the playverse subroutine. It fetches each string found in a data statement (BASIC knows to start the data pointer at the first data statement in your program), copies that string into the variable nextline\$, and then uses play on that string variable. It stops when an empty

string is encountered. The empty string as used here, by the way, is referred to in the literature as a sentinel value. A sentinel value is a user-defined value that cannot possibly occur in a valid list of data and can therefore be used to stop a sequence of actions (normally data entry, as in this example). You'll often see -1, 0, or a large number such as 9999 used for the same purpose in data statements that use numeric values.

The first two calls to `playverse` together play the first of `reveille`'s three parts. The first call plays the section labeled `refrain`, a section used by all three parts of the bugle call. At this point, the data pointer points to the data comment as Part 1, and that's what gets played on the second call to `playverse`, right up to its null (sentinel) string.

As we get ready to play Part 2 of `reveille`, the utility of the data and restore statements becomes clear. The second part of `reveille` reprises the first section, which is labeled `refrain`. We could take the easy way out and just copy the data statements, but BASIC was originally designed with 4K or 8K free system memory in mind, not 640K. The restore statement allowed you to reset the data pointer back to the first data statement. We'll quickly see that this wouldn't really do the job for this program, but luckily restore was later supplemented to allow you to restore to a particular line number, meaning that the data pointer would now point at the data statement on the given line. Later, an alphanumeric label (like `refrain` in this example) could also be used.

So to play the second part, `restore` moves the data pointer to the first data statement. However, this time we want to play the data statements labeled part 2 after we play `refrain`, not part 1.

After the `refrain` is played, a `restore part 2` allows us to skip over part 1 and go directly to the part 2 label when a subsequent call to `playverse` executes its first read statement.

So far, so good. We've seen how data statements let us embed initialized data into a program, which no popular language until C would allow, several years after BASIC's rise to unprecedented popularity. We've also seen how to reorganize the sequence of this data by using the restore statement with a line label. Why bother with files?

Because files allow the crucial separation of program and data—that's why. As you can see, the sample program `play1.bas`, above, is written for a BASIC compiler. If you decide to change the tune it plays or to give it an option to play more than one tune, you'll be confronted by a morass of data statements that could haunt you for the entire life of the project. Every time you want to add or edit a song, you'll have to recompile. Worse, the people to whom you distribute your program would have no way to add or change

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tunes themselves, unless they had the source code to your program and a BASIC compiler and they knew how to program.

No, data statements are only helpful when the data set is small, does not change, and is only used once. For example, some BASIC programs contain short subprograms in machine language. If they total a page or less of source code, converting them into data statements isn't a bad idea. Otherwise, they should reside in separate object modules.

The solution to data that changes while the program doesn't is to use files. First the good news: They're very easy to use once you get the hang of file I/O statements and maintenance. Now the bad news: The data in sequential files (as in this example) is used in a continuous stream from top to bottom, and the only way to change position is to start back at the beginning of the file.

These compromises are well worth the limitations, and you can always use random files for more sophisticated manipulation of the file pointer (eliminating the ability to use ASCII files, though).

Here is the new program, with a data file following it. Save the data file as an ASCII file under the name play.dat.

Make sure this file ends with a blank line!

Otherwise, the loop won't stop because the sentinel will never be found. When you want to add a song, just place it in a different file under a new name and pass that name to the playtune subroutine.

```
declare sub playtune (filename$)
' Play2.bas—tested with
' PowerBASIC and QuickBASIC.
' Illustrates separation of program
' and data by placing the
' tune to be played in a sequential
' ASCII file. Read in the file
' play.dat and play it. stop
' when a blank line
' is encountered.
call playtune ("play.dat")
' Playtune opens the ASCII data
' file filename$ and reads in the
' music data to be played, playing
' each string until a null string
```



```
' (blank line) is hit.
' End your file with a blank line!
' Filename$ is an ASCII data file.
' Make it usable for reading.
' Loop until the sentinel value
' (a blank line) is encountered.
' Read in a line. Play it unless
' it's blank. In that case, quit.
' Return the file resources to DOS.
sub playtune(filename$)
  open filename$ for input as #1
  do
    line input #1, nextline$
    play nextline$
  loop until nextline$ = ""
  close #1
end sub
```

Here is the ASCII file play.dat. End it with a blank line and save it as an ASCII file.

```
P8 C32 P32 P16 F32 P16 L16 A F C32
P16 C32 P32 P16 F32 P16 L16 A F C16
P16 C32 P32 P16 F32 P16 L16 A F C16
P16 L16 F P16 L4 A F8 P8
P8 C32 P32 P16 F32 P16 L16 A F C32
P16 C32 P32 P16 F32 P16 L16 A F C16
P16 C32 P32 P16 F32 P16 L16 A F C16
P16 C16 P16 L4 F
MS
P8 L8 A A A A A L4 O5 C
L8 O4 A F A F A F
L8 A A A A L4 O5 C
L8 O4 A F A F C C L4 MS F
```

Tom Campbell
Programming Power

Chapter 9

Applications

Probably most of your computer time is spent in applications. And probably too much of your time is spent fighting with those applications, getting your work done almost in spite of the tools that should be helping you out. We've all been through it. But it doesn't have to be that way. You can learn to bend your programs to your will and actually get some useful work done. This chapter is full of important little tips for getting the most out of your applications and environments—some general and some specific.

In this chapter you'll learn

- Tips for speeding up your work
- Hiding your spreadsheet from prying eyes
- Getting out of 1-2-3 fast
- WordPerfect made more powerful
- Working with full-page monitors
- Macros for the most popular word processors

Learn the Speed Keys

If you're working with one of the many programs that offer both menus and speed keys—WordPerfect and most Windows programs are good examples—

learn the speed keys. Most user interfaces that support menus and speed keys put the speed keys next to the menu items. Start building the habit of using the speed keys.

Mark Minasi

Getting Started with Applications

Read the Manual

Don't just read the manual, reread it. Too many of us learn one way to do something and stick with that way. Take a few minutes every day and review a manual on a program that you think that you really know well; you'll be surprised what you can learn. For example, can you think of three ways to keep the output of the DIR command from scrolling off the screen? Here are four: DIR/P, DIR|MORE, DIR>DIROUT.TXT<Ctrl-T>EDIT DIROUT.TXT (that redirects the directory output to a file, then views the file with EDIT), and, finally, the brute-force approach of just pressing the Pause key as the data scrolls by. The <Ctrl-T> means to press the Ctrl key and the T key. DOS, Windows, and most applications are full of little secrets like that, and most of them are spelled out in the manual, if you take the time to read it.

Mark Minasi

Getting Started with Applications

Take Notes

Build a paper database of software expertise. Get a bunch of 5 x 8-inch file cards, and keep important commands on those cards. Say you've just started learning Word, and you find that you can't seem to remember the keystroke that lets you select a character's font. Start a Word card, and write the command and the keystroke on the card. Do this every time you're stuck on something, and you'll end up with a terrific personal manual for every application that you use. If you have a tower computer, tape a big envelope on the side of the computer and keep the cards there, or put them under the keyboard, as there's usually a small clear space under there.

Mark Minasi

Getting Started with Applications

Scout Files That Need to Be Archived

Use the following command to list the files on your hard disk that haven't been backed up: DIR \ /aa /s. This tells the DOS 5.0 DIR command to list all

files with the archive attribute, the DOS attribute that signifies that a file hasn't been backed up, and to search the whole disk from the root down.

Mark Minasi

Getting Started with Applications

Understand BUFFERS

Here's absolutely my last tip about BUFFERS. For years, we've heard discussions about what exactly is the right value for the BUFFERS= command in DOS. The value has always been something of a tradeoff; too many BUFFERS is bad because it steals from your conventional memory, and on slow machines (10 MHz or less) having too many buffers can actually slow performance. Too few buffers, on the other hand, can force the computer to read and reread data from disk unnecessarily.

Part of the concern about BUFFERS= is no longer valid, as they can now be loaded above conventional memory. When you load DOS=HIGH in CONFIG.SYS, the buffers and file handles load above 1024K. Buffers, however, are a holdover from the days before the general use of disk cache programs. Early disk cache programs had some serious problems, but there's no reason not to use a modern cache such as the old reliable PC-Kwik cache, or the excellent new SMARTDrive version 4.0, which is included with Windows 3.1. (That's either one. I've seen too many autoexec.bat and config.sys pairs that load the SMARTDrive cache program, the cache that comes with the Norton Utilities, and the cache that comes with PC Tools.) These programs remove most of the need for BUFFERS, so just set your BUFFERS=10, and don't worry any more about optimizing your system properly.

Mark Minasi

Getting Started with Applications

Using SMARTDrive

Speaking of SMARTDrive—the new version 4.0 is not only a better cache than the old SMARTDrive, it's also smarter about working with your system. You shouldn't load SMARTDrive high. If your computer will allow programs to load high, SMARTDrive will automatically load itself high. (PC-Kwik has been doing this for years; soon most utilities will load themselves high.) And notice that SMARTDrive is now in your autoexec.bat, not in your config.sys. On some computers, SMARTDrive may load in both config.sys and autoexec.bat, although the only reason that you'd load SMARTDrive through the config.sys would be if you have a hard disk controller that requires something called double buffering.

If you see that the Windows 3.1 installation program has added SMARTDrive to your config.sys with the Double Buffer option added, leave it there! And don't load that portion of SMARTDrive (the part that may optionally be in config.sys) into upper memory, as it may cause data loss. It's only about 2.5K, and so doesn't take a huge bite out of your conventional memory. Even if you do double-buffer, the lion's share of SMARTDrive still loads high.

If you want to force SMARTDrive to load low, use /L for the low option. The line in autoexec.bat would look like smartdrv /L.

Mark Minasi

Getting Started with Applications

Flushing SMARTDrive at Shutdown

Remember that SMARTDrive delays the actual disk write process, so you can't be entirely sure that your data has been written to disk even if your application claims that it has been. Before turning your computer off, be sure to force SMARTDrive to flush the cache by typing SMARTDrive /C.

Mark Minasi

Getting Started with Applications

Double Clicking Made Easy

Here's a double-click tip. Seems like some folks just can't double-click under Windows. They bear down too hard on the mouse, causing it to jump around while they're double-clicking. Unfortunately, that means that Windows sees the two clicks as two separate clicks.

If you've given up on Windows because you're convinced that you hopelessly suffer from double-clickslexia, there's help in Windows 3.1. There are two new commands that can be placed in the [Windows] section of WIN.INI: doubleclickheight= and doubleclickwidth=. They set an area within which two clicks can occur and still look like a double-click. The default is 4—the units are screen pixels, so it's a small area. You need only modify your WIN.INI to make that value larger.

To double the double-click zone, add these lines to WIN.INI:

```
DoubleClickWidth=8  
DoubleClickHeight=8
```

Mark Minasi

Getting Started with Applications

An Undocumented Word Command

If you have Word For Windows 2.0, try this. Click Tools/Macro..., then type in Spiff, and click Edit. You'll see a Begin line, a blank line, and an End line. Delete the first and third lines, but leave the blank line intact—this may be easier if you turn on paragraph marks (Tools/Options.../Paragraph marks). Now click File/Close, and respond Yes. Then click Help/About..., and you'll see the usual About Word box. Click on the Word logo, and weird things will happen. I won't give it all away, but it involves a Word Perfect monster, helpless users, and Word For Windows saving the day.

Mark Minasi

Getting Started with Applications

Create a Quick Security Screen

Want to quickly hide a spreadsheet from prying eyes? First, if you're using a Windows-based spreadsheet, minimize it. A related method is to move your mouse to the place on the screen that activates the Windows screen blanker (it's the upper-right corner for IdleWild and adjustable for Intermission).

Second, if you run a DOS spreadsheet under Windows, you can hide your screen by pressing Ctrl-Esc to bring up the Windows Task List.

For non-Windows users, 1-2-3's "show graph" key comes in handy. If you're not working with a graph, F10 effectively blanks your screen.

Mark Minasi

Getting Started with Spreadsheets

Get Out of 1-2-3 Menus Quickly

Sometimes you'll find yourself five levels deep in a 1-2-3 menu looking for a quick exit. The typical action is to lean on the Esc key, but that's not necessary. Just press Ctrl-Break, and the nested menus will disappear quickly.

Mark Minasi

Getting Started with Spreadsheets

Create a Retirement-Planning Spreadsheet

Just how much will you need to put away in order to retire while you're still young enough to enjoy it? Well, to start off, you need to know the following:

CURAGE = your current age.

RETAGE = desired retirement age.

FINALAGE = estimated age at death.

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RROR = the rate of return on your investments after inflation. If your IRA yields 6 percent and inflation is 5 percent, RROR is 1 percent. Be honest about this: Optimistic guesses will lead you to retire a few years too early and spend your golden years in penury.

CURWLTH = the current dollar value of your savings and investments.

Leave the house's value out; you'll need somewhere to live even when you are retired.

FUTINC = desired annual retirement income in today's dollars.

Put those data in the spreadsheet as named ranges; then follow them with the following formulas.

$\text{YRSRET} = \text{FINALAGE} - \text{RETAGE} + 1$

$\text{YRSLFT} = \text{RETAGE} - \text{CURAGE}$

$\text{LUMPSUM (lump retirement sum needed)} = \text{FUTINC} * (((1 + \text{RROR})^{\text{YRSRET}} - 1) / ((1 + \text{RROR})^{\text{YRSRET}} * \text{RROR}))$

$\text{FUTWLTH (value at retirement of current wealth)} = \text{CURWLTH} * (1 + \text{RROR})^{\text{YRSLFT}}$

$\text{AMTSAV (the amount to be saved)} = \text{LUMPSUM} - \text{FUTWLTH}$

$\text{ANNSAV (amount to be saved each year)} = \text{AMTSAV} / (((1 + \text{RROR})^{(\text{YRSLFT} + 1)} - 1) / \text{RROR})$

Plug this into your spreadsheet and do some what-ifs. Don't forget your pension savings when calculating current wealth, and figure that you'll need 70 to 80 percent of what you're making now during your retirement years.

Mark Minasi

Getting Started with Spreadsheets

Get Spreadsheet Documentation Tools

Programs like CellMate allow you to annotate spreadsheets for Lotus 2.1. Later versions of Lotus make it a bit easier—3.x has the three dimensional quality that allows you to use one two-dimensional plane as a documentation plane. Spreadsheet Auditor is another help here, but the bottom line is that a big spreadsheet is a data processing professional's nightmare: basically a huge undocumented program. Enforce strict documentation standards on yourself and your company, or one day you'll wonder just what these spreadsheets do.

Mark Minasi

Getting Started with Spreadsheets

Avoid Manual Calculation Blues

All of us learn quickly to set the calculation method to manual when a spreadsheet grows beyond a few K, or every keystroke causes an agonizing recalculation delay. But we forget that the numbers in the spreadsheet can't be trusted until we force a recalculation. Several times I've had employees bring me baffling spreadsheets. After scratching my head for a while, I'd look at their printouts and say, "Did you recalc this before you printed it?" I always get a sheepish grin.

Mark Minasi

Getting Started with Spreadsheets

Solve FAT Error When Installing Excel

PageMaker, Excel, and a number of other Windows applications get apoplexy when they are installed on a drive larger than 32MB under DOS 4 or 5 when the Share program has been run. The installation routines for these programs can't handle drives after Share has been run. The solution is simple: Rename share.exe to sharon.exe or something else, and reboot.

Mark Minasi

Getting Started with Spreadsheets

Get 1-2-3 to Print Correctly

1-2-3 used to drive me crazy by printing over the page perforations on my dot-matrix printer. It seemed totally unaware of the dimensions of the printed page. The solution is in the manual.

Before printing, align the paper so the printhead is sitting just below the paper perforation. Then type /PPA (Printer Print Align); 1-2-3 now knows where the paper begins.

If you use a laser, be aware that 1-2-3 is largely unaware that lasers figure 62 lines per page, not 66. You can set that information with /PPO (Printer Print Options). Alternatively, you can convince your printer to print 66 lines per page by sending it the following: E<ESC>&l14c1e7.64c66F where <ESC> is the escape code, ASCII 27. Note that the early part of this code sequence is ampersand-lowercase L-one.

Mark Minasi

Getting Started with Spreadsheets

Landscape-Print with LaserJet III, Excel

If you've loaded Excel under Windows 3.0 with the LaserJet III driver, you'll find that landscape printing doesn't work. Don't fiddle with the options or Control Panel; the problem isn't fixable. Microsoft claims that there's a bug in the HP III driver for Windows. There is an answer, however: The April 1991 HP series III driver for Windows fixes the problem.

Mark Minasi

Getting Started with Spreadsheets

Print Tiny Letters with a LaserJet III

Not only does the new LaserJet III driver work well with Excel, but it also helps produce large and readable spreadsheets. I use the Univers built-in typeface at six-point size. When printing in landscape mode—which works fine with the latest HP driver—you'll get lots of columns on a normal 8 x 11 Inch page. The latest driver also is 30 percent faster. Call HP or visit CompuServe's HP forum to get version 3.778 HP series III driver for Windows.

Mark Minasi

Getting Started with Spreadsheets

Use the Plus as a Placeholder

I often jump around a spreadsheet looking for some bit of information. Once I've found it, I have to remember where I was in the first place. Then I realized that spreadsheets let you move anywhere while building a formula. Once you've pressed the + key, you can move anywhere. To jump back to your original location, press Esc. (Tip courtesy of Mike Sola, my spreadsheet whiz.)

Mark Minasi

Getting Started with Spreadsheets

Macro Programming

The word programming brings to mind never-ending lines of confusing and unforgiving computer code complete with bugs and a lot of trial and error. Who needs it? Let the programmers program. Just give me software that does what it's supposed to. Sound familiar? What many users fail to realize is that creating program code for a word processor is often no different from performing normal functions within the software. Wouldn't you like to format a

letter complete with margins, date, heading, salutation, font style, and signature block—all with one keystroke? Or how about transposing words or paragraphs by merely pressing Alt-T? You can automate these and other routine tasks. It's easy, once you understand how to use your word processor's macro feature.

Put simply, a macro is a file containing recorded keystrokes and commands that your word processor can execute. Most word processors come with a macro recorder built in. Turning it on requires only a couple of keystrokes or mouse clicks. As with a high-speed tape recorder, everything you do until you turn off the macro recorder is saved. You can replay the keystrokes anytime you want.

Each of the three word processors discussed in this article—WordPerfect for DOS (WPDOS), WordPerfect for Windows (WPWin), and Word for Windows (WinWord)—handles macros a little differently. But the result is the same: You save time by automating repetitive tasks.

WPDOS lets you create one-key-stroke-combination (Alt-letter) macros and one-word macros. The two Windows applications also let you assign macros to keystrokes, although they're a little more difficult. And you can place them on the Button Bar in WPWin and on the Toolbar in WinWord.

The key to recording macros is to know exactly what you want them to do before you start. Know each step. I go through the process once or twice before invoking the macro recorder.

For practice in creating macros, here are ten popular, useful macros. Note that WPWin doesn't automatically assign macros to keystrokes. You must do that with Preferences.

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Insert Today's Date

WPDOS. To start the macro recorder in WPDOS, press Ctrl-F10 (hold down the Ctrl key and press F10). Name (or define) the macro by pressing Alt-D. At the Description prompt, type Insert date and press Enter. The recorder will now record your keystrokes. Enter the date as you normally do in WPDOS: Press Shift-F5; then press 2. The date is entered. Press Enter twice to put a line between the date and the next text you type, and then press Ctrl-F10 to turn off the macro recorder.

You can now enter the date anytime by simply pressing Alt-D.

WPWin. To start the macro recorder in WPWin, click on the Macro menu; then click on Record. In the Filename field, type Date (WPWin automatically gives the file the default WCM macro extension). In the Descriptive Name field, type Insert date, and then click on OK. WPWin is now recording keystrokes and commands. (While the recorder is on, the mouse isn't available for selecting text and graphics.) Click on the Tools menu; then click on Date. Select Text from the submenu. Press Enter twice to place a blank line before the next text you type. Now turn off the macro recorder by clicking on the Macro menu and selecting Stop.

To run this macro now, select Play from the Macro menu, find the filename date.wcm in the Play Macro dialog box, and double-click on it (or select it and click on the Play button).

WinWord. To start the macro recorder in WinWord, select Record Macro from the Tools menu (version 2.0). Type Date in the Record Macro Name field, place the cursor in the Key field, and press Shift-Ctrl-Q (this assigns the macro to this keystroke combination). Type Insert date in the Description field and click on OK. WinWord is now recording your keystrokes. To enter the current date, select Date and Time from the Insert menu. Find the date format you want and double-click on it. The date is inserted. Press Enter twice to insert a blank line, and turn off the recorder by selecting Stop Recorder from the Tools menu.

To run this macro now, select Macro from the Tools menu, find the macro Date in the Macro Name list, and double-click on it.

William Harrel

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Italicize a Word

To record this macro, you should have some text on your screen.

WPDOS. Begin by placing the cursor anywhere on the word you want to italicize. Start the macro recorder; then define the macro by pressing Alt-I. At the Description prompt, type Italicize a word and press Enter. The recorder is on. Press Ctrl-Right Arrow to move the cursor to the next word. Press F12 to turn on Block, and then press Ctrl-Left Arrow. The word you want to italicize is highlighted. Press Ctrl-F8 for Font, 2 for Appearance, and 4 for Italic. The word is italicized. Press Ctrl-Right Arrow to move the cursor to the next word, and then turn off the macro recorder (Ctrl-F10).

You can run this macro anytime by placing the cursor on a word and pressing Alt-I.

WPWin. Begin by placing the cursor anywhere on the word you want to italicize. Start the macro recorder; then type *Italic* in the Filename field. In the Descriptive Name field, type *Italicize a word* and click on OK. The recorder is on. Press Ctrl-Right Arrow to move the cursor to the next word, press F12 to turn on Select Mode, and then press Ctrl-Left Arrow. The word is highlighted. Press Ctrl-I. The word is italicized. Press Ctrl-Right Arrow to move the cursor to the next word, press F12 to turn off Select Mode, and then select Stop from the Macro menu to turn off the macro recorder.

WinWord. Begin by placing the cursor anywhere on the word you want to italicize. Start the macro recorder and then type *ItalicWord* in the Record Macro Name field. Place the cursor in the Key field and press the I key. In the Description field, type *Italicize a word* and then click on OK. The recorder is on, ready to record your keystrokes. Press Ctrl-Right Arrow to move the cursor to the next word. Press Shift-Left Arrow to select the word. The word is highlighted. Press Ctrl-I. The word is italicized. Press Right Arrow to move the cursor to the end of the word, and select Stop Recorder from the Tools menu.

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Spell Check a Word

If you've ever typed a word and then wondered if it was spelled correctly, this macro makes checking it easy. Begin with some text on your page.

WPDOS. Place the cursor on or directly after the word to check. Start the macro recorder, and then press Alt-W to define the macro. Type *Spell check a word* at the Description prompt. Press Ctrl-F2 for Spell; then press 1 for Word. Remember to turn off the macro recorder (Ctrl-F10).

If the word is spelled correctly, the cursor will move to the next word. If it's incorrect, the word will be highlighted. Correct it as you normally would. Return to your document by pressing the Esc key.

WPWin. Place the cursor on or directly after the word you want to check. Start the macro recorder, and type *Spelword* in the Filename field. Type *Spell*

check a word in the Descriptive Name field, and click on OK. Press Ctrl-Right Arrow to move the cursor to the next word. Press F12 to turn on Select Mode, and then press Ctrl-Left Arrow. The word is highlighted. Click on Speller on the Button Bar (or select Speller from the Tools menu), click on Start, and then turn off the macro recorder.

If the word is spelled correctly, a Spell check completed box appears. If the word's incorrect, change it as you normally would in WPWin.

WinWord. WinWord doesn't allow you to access the Macro menu while the Spelling dialog box is open. You can create this macro, but it requires some fairly sophisticated programming. See the tip on Editing Macros for information on modifying macros.

Transpose Two Words

Begin with some text on your screen.

WPDOS. Place the cursor on the first of the two words you want to transpose. Turn on the macro recorder, and then press Alt-T to define the macro. Type Transpose two words at the Description prompt and press Enter. Press Ctrl-Right Arrow to move to the next word. Press F12 to turn on Block; then press Ctrl-Left Arrow. The first word is selected. Press Ctrl-F4 for Move, enter 1 for Block, and then enter 1 for Move. The word is deleted. Now press Ctrl-Right Arrow and press Enter. Turn off the macro recorder.

When you run this macro, be sure to begin with the cursor on the first word you want to transpose.

WPWin. Place the cursor on the first of the two words you want to transpose. Turn on the macro recorder. Type Tpose-w in the Filename field, type Transpose two words in the Descriptive Name field, and then click on OK. Press Ctrl-Right Arrow to move to the next word, press F12 to turn on Block, and then press Ctrl-Left Arrow. The first word is selected. Click on Cut in the Edit menu (or on the Button Bar). The word is deleted. Press Ctrl-Right Arrow to place the cursor one space after the word you want to transpose. Select Paste from the Edit menu (or from the Button Bar) and turn off the macro recorder.

When you run this macro, be sure to begin with the cursor on the first word you want to transpose.

WinWord. Place the cursor on the first of the two words you want to trans-

pose. Turn on the macro recorder. Type TransposeWords for the Record Macro Name. Press 2 in the Key field and type Transpose two words for the Description; then click on OK. Press Ctrl-Right Arrow to move to the next word and Shift-Ctrl-Left Arrow to select the word. Click on Cut in the Edit menu. The word is deleted. Press Ctrl-Right Arrow to place the cursor one space after the next word. Select Paste from the Edit menu; then turn off the macro recorder.

When you run this macro, be sure to begin with the cursor on the first word you want to transpose.

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Count Words

Make sure you have some text onscreen before you start.

WPDOS. Start the macro recorder; then press Alt-C to define the macro. Type Count words at the Description prompt and press Enter. Press Ctrl-F2 for Spell and 6 for Count. When WordPerfect stops counting, turn off the macro recorder. Press Esc twice to return to your document.

WPWin. You don't need a macro to count words in WPWin. Simply select Word Count from the Tools menu.

WinWord. WinWord doesn't allow you to access the Macro menu while the Statistics dialog box is open. You can create this macro, but it requires some fairly sophisticated programming. See the tip Editing Macros for information on modifying macros.

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Transpose Two Paragraphs

Make sure you have at least two paragraphs of text on your monitor.

WPDOS. Begin with the cursor anywhere in the first of the two paragraphs you want to transpose. Turn on the macro recorder; then press Alt-P to define the macro. At the Description prompt, type Transpose paragraphs and press Enter. Press Ctrl-F4 for Move, select 2 for Paragraph, and enter 1 for Move. The first paragraph is deleted. Press F2 for Search, and at the Srch prompt,

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press Enter to search for a hard return. Press F2 to start the search. The cursor is on the line beneath the second paragraph. Press Enter, and then turn off the macro recorder.

When you run this macro, make sure you place the cursor on the first of the two paragraphs.

WPWin. Begin with the cursor anywhere in the first of the two paragraphs you want to transpose. Turn on the macro recorder; type Tpose-p in the File-name field and Transpose paragraphs in the Descriptive Name field. Click on OK. Choose Select from the Edit menu and Paragraph from the submenu. Select Cut from the Edit menu. The first paragraph is deleted. Now select Search from the Edit menu. In the Search dialog box, click on the Codes button. Scroll through the list of codes and double-click on HRt; then click on Close. Click on Search. To insert the first paragraph, select Paste from the Edit menu (or the Button Bar). Turn off the macro recorder.

When you run this macro, make sure you place the cursor on the first paragraph.

WinWord. Begin with the cursor at the beginning of the first line (before the tab indentation) in the first of the two paragraphs you want to transpose. Turn on the macro recorder; type TransposeParagraphs for the Macro Record Name and Transpose adjacent paragraphs for the Description. Press P in the Key field. Click on OK. Press Shift-Ctrl-Down Arrow to select the first paragraph. Choose Cut from the Edit menu (or the Toolbar). The first paragraph is deleted. Press Shift-Down Arrow to move to the next paragraph. To insert the first paragraph, select Paste from the Edit menu (or the Toolbar). Turn off the macro recorder.

When you run this macro, be sure to place the cursor at the beginning of the first line in the first of the two paragraphs you want to transpose.

William Harrel

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Insert Bullet

You can make items in a list stand out from straight text if you set them up as a bulleted list with a hanging indent.

WPDOS. Begin with the cursor where you want to start a bulleted list. Start the macro recorder and press Alt-B to define the macro. Type Bullet at the De-

scription prompt; then press Enter. Press Ctrl-V for Compose. At the Key= prompt, type 4,0 and press Enter. Press F4 for Indent, and stop the macro recorder.

WPWin. Begin with the cursor where you want to start a bulleted list. Start the macro recorder and type Bullet in the Filename field and Insert bullet in the Descriptive Name field. Click on OK. Press Ctrl-W for WordPerfect Characters. Type 4,0 in the Number field and click on Insert and then on Close. Select Paragraph from the Layout menu, and select Indent from the submenu. Stop the macro recorder.

WinWord. WinWord is shipped with a bullet macro on the Toolbar.

William Harrel

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Letter Template

Begin with a new document screen. At the instruction Type return address, type in the following information:

Your Name, Title
Your Company
Your Company's Street Address
The City, State ZIP code

WPDOS. Start the macro recorder. Press Alt-L to define the macro, and type Letter template at the Description prompt. Press Enter. Press Shift-F8 for Format; select 2 for Page and 5 for Top/Bottom margins. Type 1.75 (or the measurement for your stationery). Press Enter twice. Select 1 for Center Page and Y for Yes; then press Enter. Press 1 for Line, 3 for Justification, and 1 for Left. Then press Enter twice to return to the document screen.

To enter the current date, press Shift-F5, and then select 2 for Date. Press Enter twice to insert a blank line. Type Return address. Press Enter twice, and then type Dear. Press Ctrl-F10 to end the macro record. You're now ready to type the letter.

WPWin. Start the macro recorder. In the Filename field, type Letter. Type Letter template in the Descriptive Name field. Click on OK. Select Margins from the Layout menu, press Tab twice to move to Top, and type 1.75 (or the meas-

urement for your stationery). Click on OK. Select Page from the Layout menu; then select Center Page from the submenu. Select Date from the Tools menu and select Text from the submenu. Press Enter twice to insert a blank space. Type Return address, press Enter twice, and type Dear. Turn off the recorder. You're now ready to begin typing the letter.

WinWord. WinWord is shipped with a very sophisticated letter-template macro. It is, in fact, an impressive example of the power of WordBasic, WinWord's macro language. Access the template by selecting New from the File menu and then double-clicking on Letter in the templates list. You can modify margins, fonts, and other settings as needed. Be sure to save the template after you've changed the settings.

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Insert Text (Closing a Letter)

Begin with an empty screen or at the end of a letter you want to close. At the Type the signature block instruction in each procedure, follow these steps: Type Thanks for your time and consideration. Then press Enter. Type Sincerely, and press Enter 4 times. Then type in your name, title, and company.

WPDOS. Start the macro recorder, and then press Alt-E. Type End letter at the Description prompt and press Enter. Type the signature block. Stop the macro recorder.

WPWin. Start the macro recorder. Type Close in the Filename field and Close letter in the Descriptive Name field. Click on OK. Type the signature block, and stop the macro recorder.

WinWord. The letter template shipped with WinWord provides several letter-closing options.

William Harrel

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Sign a Letter

For this macro, you need a scanned image of your signature. If you don't have a scanner, you can have your signature scanned at a desktop publishing service bureau for a nominal fee.

First, use your word processor's graphics import, placing, and sizing options to create a document that looks like the one in the following example.

WPDOS and WPWin users, save the file as signbloc.wp5. WinWord users, don't save the document; instead, go to the WinWord procedure below. WPWin users, record the macro at the end of a letter you want to sign.

WPDOS. Turn on the recorder. Press Alt-S to define the macro, type Sign letter at Description, and press Enter. Press Shift-10 for Retrieve; then type signbloc.wp5 (be sure to include path information, if applicable). Press Y to retrieve current document. Stop the recorder.

WPWin. Select Record from the Macro menu. Type Sign in the Filename field and Sign letter in the Descriptive Name field. Click on OK. Select Retrieve from the File menu; then type signbloc.wp5 for the Filename (be sure to include path information, if applicable). Click on OK; then click on Yes to retrieve current document. Stop the macro recorder.

WinWord. The most efficient way to insert data into a WinWord document is with Glossary, an extension of WinWord's Merge feature. The procedure is simple: Select the data you want to include in the glossary, choose Glossary from the Edit menu, name the glossary, and then click on Define. Each time you want to use the data, insert a glossary bookmark using the Field option on the Insert menu.

This procedure is detailed in the WinWord manual. If you'd rather create a macro, the procedure is almost identical to the one in WPWin except that you'd name the signature block file signbloc.doc and select File... from the Insert menu to retrieve it.

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Editing Macros

Why would you want to edit a macro? To make it do something it wasn't programmed to do—such as run (chain) another macro, pause so that you can enter data from the keyboard, or run itself over and over (say, to make the first line of 15,000 addresses bold). Another common reason is to change text in long macros, rather than rerecording them. The more you think about it, the more reasons there are.

Each program's macro language is different (and complex). Once you've

learned to use it, though, you'll increase your efficiency. Here's a review on how to edit macros in WPDOS, WPWin, and WinWord.

WPDOS. To edit a macro in WordPerfect for DOS, the macro file must already exist. First, start the macro editor just as you'd begin to record a macro (press Ctrl-F10). Next, type the name of the macro (Alt-T or Alt-C, for example) you want to edit; then select 2 for Edit. You can enter text and commands into the macro directly from the keyboard (see the top figure) or by pressing Shift-Ctrl-Page Up to bring up a list of macro programming commands. The manual describes each of the commands and how to use them.

WPWin. This program's macros are written and edited in the word processor. Edit a macro in WordPerfect for Windows the same way you would a document—select Open from the File menu and load it. You can enter text and commands directly, or you can insert commands with the Macro Command Inserter, which is nothing more than a very sophisticated macro itself. WPWin comes with an extensive macro language. If instructions for using it weren't included with your software, contact WordPerfect for information on how to obtain them.

WPWin also comes with a feature you'll find very handy: a tracer that alerts you to errors in the macro code and possible problems and solutions.

WinWord. Word for Windows comes with a macro editor accessible through the Macro command. Text and commands are entered directly from the keyboard. For commands that use variables, you can use the Variables option, which opens a dialog box containing the variables available to the selected command. The manual doesn't contain much information on WordBasic, WinWord's macro language, but it's shipped with a file (tecref.doc) that you can load and print. Tecref.doc also has online macro help.

William Harrel

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Should You Move Up to Windows Word Processing?

Is there a Windows word processor in your future? If you're looking for power and features, Windows word processors offer a number of capabilities rarely seen in DOS word processors: WYSIWYG editing, desktop publishing's graphical and formatting tools, Windows' interactivity, and a common user

interface. Many of the packages also boast special tools to make them stand out from the crowd, such as grammar checkers, complete drawing programs, equation editors, and advanced macro languages.

One requirement shared by almost all Windows word processors is a powerful computer: at least a 386SX (though a 386DX or one of the 486 chips would be preferable) and 4MB of RAM. Most of the products claim that they can run on a 286 with 1MB of RAM. But when you read this claim, remember that you can also jog underwater. Doing so, however, will test your endurance, and it won't take you very far. If you have a lesser system, you'll have to put up with very poor performance from these programs; in fact, you'd be better off using a DOS word processor or GeoWrite.

That said, let's take a look at the features most of the Windows word processors share. You might think of these as the baseline of features reasons to make the switch to word processing under Windows. If you're considering a word processor that doesn't offer one or more of the options mentioned here, you'll be missing out on something everyone else takes for granted.

Although most Windows word processors share a majority of features, implementation varies considerably. WordPerfect still uses boxes (entities separate from the page and featuring their own editor) instead of the more common frames (entities integrated into the page and using the same editor as the page) for graphics and incidental text. DeScribe requires that frames be created to contain all text and graphics. Ami Pro's frames are much easier to work with than Word's. Ami Pro seems to assume that you want to work with the frame itself—sizing and moving it—whereas Word seems to assume that you're more interested in working with the contents of the frame and makes selecting the frame and adjusting its size and shape more awkward.

Almost all of the word processors feature draft mode (allowing you to work with text as text rather than as formatted copy), but Ami Pro retains almost all of the formatting in draft mode while WordPerfect's draft mode looks almost exactly like what you would find in WordPerfect for DOS (right down to the light gray letters and the blue background).

Most Windows word processors also provide a series of different kinds of views. In addition to the draft mode, most allow you to zoom in on your text to see it enlarged and zoom out to see a whole page or two side-by-side pages at once. Some allow you to specify a view according to percentage of full size.

Windows word processors almost universally offer styles for specially formatting paragraphs (WordPerfect also allows for open-ended styles that format the entire document). In addition, they provide options like lines and

borders that allow you to box a page or a frame and to put lines between paragraphs and columns.

You can find table editors on many Windows word processors. Most allow you to create a table by simply specifying the number of cells and rows, while others require additional information about the width of the table. Some allow for the full range of table customization, including varying column width and row height, different outline schemes, shading, table outline, captioning, and even colors. Most also offer a rudimentary spreadsheet operation.

Not only Windows word processors but nearly all word processors now offer spelling checkers as standard equipment. Thesauruses have also gone from useful extras to must-haves, and now the thesaurus in WordStar for Windows goes the extra mile, offering definitions, alternative words, near synonyms, and antonyms.

Mail merge (or simply merge) is a powerful feature that you can use for preparing mass mailings for business purposes (you can also use it to generate a Christmas letter or other announcements of family events) using a data file and a form letter.

Most of the programs offer macros, allowing you to assign a macro to a menu or to an icon bar. In this way, you can make your personal commands as much a part of the program as the commands created by the programmers.

Look for special file managers with your word processor. Look for master document features, too. Most Windows word processors allow you to group document files into complete publications for printing and editing. Most also offer table of contents and index generators that will automatically create these features for a master document, checking each of the component documents in turn.

The remainder of the shared features are common user interface features—the standard keypresses and the file-management and document-processing tools. What will probably impress you most about these packages is their desktop publishing capabilities. Each approaches desktop publishing in a slightly different way, but all seem to have it as their central focus. Let's face it—few writers would put up with a Windows application if it didn't offer superior formatting and control along with its WYSIWYG interface. Many writers will prefer to stick with the DOS word processor they know and love. If you're looking beyond writing and you want to turn out splendid documents, you must ask yourself which tools are most valuable to you, seek out the word processor that offers them, and start publishing.

Robert Bixby

Test Lab

Who Needs Spreadsheets?

Spreadsheets are the fuel powering the computer revolution. And in this capacity, they've often legitimized a platform, its operating system, or both. Strange as this may sound, it's supported by history.

When VisiCalc hit the scene in 1979, it turned the Apple II from a toy into a powerful business machine. Apple II sales skyrocketed, and it became the personal computer for the computer revolution's first generation. People often walked into computer stores asking for VisiCalc and a machine that could run it, knowing little or nothing about Apples or any other computers.

Next came Lotus 1-2-3. It was a tremendous improvement on VisiCalc and the epitome of user-friendly software in 1983. To run it, however, you needed an IBM PC. This created a huge demand for the early crop of PCs. Soon there were millions of PCs in homes and offices everywhere, and a large number of them were running 1-2-3.

When Excel appeared for the Mac in 1985, it was the most powerful spreadsheet available on any platform at any price. It forced business people to take the Mac seriously as a business tool.

And when Excel for the PC hit the software shelves, everyone started thinking of Windows as more than just a pretty face. Windows soon became the operating environment for PC power users, and Excel played a major role in establishing it as such.

The VisiCalc-Lotus-Excel story doesn't end there, however. VisiCalc is out of the picture, but Lotus has fired back at Microsoft's Excel with a trio of topnotch spreadsheets: Lotus 1-2-3 2.3 and Lotus 1-2-3 3.1+ for DOS and, more recently, Lotus 1-2-3 for Windows. These products, especially 1-2-3 3.1+ and 1-2-3 for Windows, are giving Excel a run for its money in the ever-hotter spreadsheet feature wars.

Excel and 1-2-3 for Windows are far from the only choices for the Windows environment. There's also Wingz. It was a dramatic innovation when it first appeared, and it can still hold its own against most competition.

Not to be outdone, Borland champions the DOS arena. It has continually improved its flagship spreadsheet, Quattro Pro, which many say is the obvious choice for DOS. But SuperCalc aficionados stand staunchly by their spreadsheet of choice because it's faster and easier to use.

Why all this excitement about spreadsheets? Because of their versatility. You can do almost anything with a spreadsheet. It's an excellent tool for handling your checkbook and household finances. It can also be used as a general-purpose database for everything from recipes to addresses. In the busi-

ness world, anything dealing with numbers, from accounts receivable to next quarter's sales projections, can be handled easily with a spreadsheet. In the educational and scientific communities, a spreadsheet is one of the primary tools for manipulating statistical data, from standard deviation to regression analysis.

Clearly, just about anyone can make use of a spreadsheet, but how do you choose the right one? First, you need to look at your platform. If you're a Windows user, you'll want a Windows spreadsheet. Windows users who are coming from a DOS version of 1-2-3 will want to give special attention to Lotus 1-2-3 for Windows. Others should take a close look at Excel.

For DOS, your choices are Quattro Pro 3.0 or SE, 1-2-3 2.3 or 3.1+, and Computer Associates' SuperCalc 5.1. SuperCalc is fast, Quattro Pro is extremely feature-rich, and Lotus is the compatibility king, boasting more add-in support than any other software product in history.

Clifton Karnes

Test Lab

WordPerfect Paging

In many programs, pressing PageUp or PageDown will move to the previous or next screen of data. In WordPerfect pressing those keys will literally move you to the previous or next page. This is especially frustrating when you want to go to the latter part of a page but don't want to scroll through the page line by line. I have found that pressing - or + on the numeric keypad with Num-Lock off will allow you to move through data screen by screen with the - key moving you to the previous screen and the + key moving you to the next screen.

Jimmy Quach

Tips & Tools

Easier PC Shell

While it's not obvious in the documentation, there's a method of dragging a mouse to select or deselect files with Central Point's PC Shell. Hold down the right mouse button with the cursor over the name of one of the files to be selected. Press and hold the left button and drag the cursor over the names of the files to be selected. All the filenames touched by the cursor will be selected (or deselected if the cursor was over an already selected file when the left button was originally pressed).

This can be used when certain files in a line or within a rectangular region are to be selected without specifying a common file extension with the Select command.

Ben Serebrin
Tips & Tools

Don't Lose a Thing

Have you ever been typing along when, all of a sudden, your computer mysteriously seizes up on you? Or perhaps a power failure or your failure to save a document before turning the computer off has cost you several hours' work? WordPerfect's timed backup feature can save you from the heartache of losing precious work. You can tell WordPerfect to save your work automatically at timed intervals. Here's how.

From the WordPerfect document screen, press Shift-F1 for Setup. At the Setup menu select 3 for Environment; then press 1 for Backup Options. You are now at the Setup: Backup screen. Press 1 for Timed Backup Options; then press Y for Yes.

You can set the intervals to anything you want, but remember that if you are working on long documents, WordPerfect could take some time to save them. If you set timed backup at every five minutes, you will be interrupted too often. Setting the intervals too far apart will run the risk of losing work completed between backups. Fifteen minutes is a good setting. Type the number of minutes you want; then press Enter and then F7 to exit.

WordPerfect will then automatically save your documents to a file with a BK1 extension (if you are using the Doc 2 screen, the backup is saved to BK2). The first time you boot WordPerfect after a crash or power failure, you are asked to rename the backup document. Name it something you will remember. Then retrieve the file you renamed from the \WP51 (or \WP50) directory the same as you would any other WordPerfect document.

William Harrel
Tips & Tools

Perfect Views

Sometimes when I'm working on a page in WordPerfect 5.1, especially after placing a graphic, I want to see what that page will look like—without printing the entire document. WordPerfect allows you to print a single page, but doing so requires several keystrokes. I have reduced the several-keystroke process to a single-keystroke macro.

Follow these steps to create a macro that will print a single page in WordPerfect 5.1 with one keystroke: Beginning at the WordPerfect document screen, turn on Macro Define by pressing Ctrl-F10. At the Define macro: prompt, press Alt-P. If no Alt-P macro exists, WordPerfect will ask you to describe the macro. Type Print a single page and press Enter. If a macro named Alt-P already exists, WordPerfect will ask if you want to replace it. Press 1 for Replace and Y for yes; then type Print a single page. (Note: If you don't want to replace the Alt-P macro, you can define this macro with any Alt-letter combination you want.) The flashing Macro Def tells you that WordPerfect is now recording your keystrokes. Press Shift-F7 for Print; then press 2 for Page. Turn off Macro Define by pressing Ctrl-F10. Now, each time you press the Alt-P combination, the page on which the cursor lies will print.

I have shortened the process for using some of WordPerfect's other features also. Alt-F takes me to Base Font for a quick font change and Alt-L turns off Justification Full and left-aligns my letters.

William Harrel
Tips & Tools

Tom Thumbnails

When I'm designing a document, I like to see it from as many perspectives as possible. I also like to show my client as many aspects of the job as I can. A convenient feature of PageMaker is its ability to print thumbnails. Thumbnails are small renderings, or pictures, of all the pages in a document. I find them especially useful for gaining a perspective on a project with several pages. Here's how you, too, can use PageMaker's thumbnail feature:

With PageMaker running and the document you want to thumbnail open, select Print from the File menu. Under Options select Thumbnails. If you are using PageMaker 4.0, you can also designate the number of thumbnails you want to print on each page. PageMaker 4.0 will also allow you to print color separation thumbnails, so you can compare separations to make sure they will print correctly. Once you have set all the parameters you want, click on OK. PageMaker will print your thumbnails.

I used to take PageMaker's thumbnail feature for granted, hardly ever using it, until I once showed thumbnails of a lengthy newsletter to a client. He was very impressed, calling it "the most comprehensive first renderings" he'd ever seen. Since then I have used thumbnails often.

William Harrel
Tips & Tools

Easy Zips

If you use PKZIP and a lot of switches such as -r to allow recursing subdirectories, -p to store the pathnames, and -wHS to include hidden and system files, you can set these as default options.

With a text editor, create a file called pkzip.cfg. In this file you'll specify the defaults. To set recursive subdirectories, add these two lines.

```
paths=recurse recurse=on
```

To include hidden and system files, add the following line.

```
mask=hidden/system
```

To set the method of compression, add this line.

```
compress=size
```

Save the pkzip.cfg file in the PKZIP directory. Then set an environment variable pkzip.cfg=c:\pkzip in your autoexec.bat file. Now you're all set. The program will default to what you've set in the pkzip.cfg file. For more information you can consult the manual.doc file in the PKZIP package.

Sandeep Tamhankar

Tips & Tools

Full-Page Software

Looking for software compatible with full-page monitors? Contact your monitor manufacturer. The manufacturer probably has drivers that will work with a long list of word processors and other programs.

Rather than have each software product provide a myriad of drivers for every conceivable computer-monitor combination, most special-purpose monitor makers provide drivers custom-made for their monitors.

Robert Bixby

Feedback

Chapter 10

Portable Computing

Increasing power, decreasing size—that's the direction of today's computer industry. And for today's computer enthusiast, the trend has proved a tremendous boon to productivity and convenience. Now you can write that winning proposal while sitting on your sofa, in a plane, or by the lake. Word processing, spreadsheets, and personal information management—even in Windows—are as close as your briefcase, thanks to the lower prices and higher technology of today's notebooks. It's no wonder that portable computing, one of the fastest-growing segments of the computer market, is also one of the most rapidly changing and closely watched segments.

In this chapter you'll learn how to

- Protect your computer
- Ship your computer
- Connect to a phone line without a free jack
- Prepare for a trip
- Preserve your files

Microsoft's Portable Initiative

Last winter, Microsoft announced its Portable Computing Initiative, the first phase of which is Advanced Power Management (APM); a ROM version of

MS-DOS 5.0; a data-transfer utility; and solid-state memory support.

The APM specification was developed jointly by Microsoft and Intel and is designed to extend the battery life of portable computers by up to 25 percent during full-on conditions. APM works by allowing the system BIOS and operating system to share critical power-management data while preserving compatibility between the hardware and software during the power-conservation process. An APM driver for MS-DOS 5.0 has shipped, and a Windows 3.1 driver followed soon after. APM is also compatible with non-APM applications. Though APM can be implemented on any of the i86-processor family, Intel built specific APM-support features into its 386SL chip. These features allow portable computer makers to implement APM functions and to keep APM overhead to a minimum.

The data-transfer utility, called Interlnk, supports a transfer rate of up to 36K per second via a parallel port. It also supports serial transfers. Microsoft's support of solid-state memory will help developers port their disk-based DOS applications to "smart cards" like Flash Memory and SRAM cards.

Several portable computer makers, including Toshiba, Everex, Epson, Zenith, and NEC, support the Portable Computing Initiative. Portable computers designed according to the new specifications should be available on the market in early 1993.

Pete Scisco

Portable Computing

Guerrilla Connections

Not every hotel will be kind enough to furnish your room with a data-capable phone—or even modular phone line jacks. If you find yourself in this situation, your first option is to call the front desk and ask that an RJ-11 jack be connected to the existing telephone line. Speak with authority and make it clear that you're a modern businessperson who requires the latest technology. Many hotels are willing to do anything within reason to accommodate their business customers.

If the hotel management won't cooperate, cordially inform them that your company won't use their facilities in the future. Then get to work setting up your own connection. Rather than ripping the phone lines from the wall (bad form, that—and it leaves you liable to prosecution), use a kit you can pick up at most electronic stores. Your kit should contain one RJ-11 module with four wires with attached clips, a set of clip leads, and wire snips.

Cut off all of the leads from the RJ-11 module but the red and green ones (you can do this ahead of time). Now, if you take off the telephone receiver mouthpiece, you can remove the voice pickup just inside. (If the telephone doesn't have a removable mouthpiece, you're on your own.) Attach your clip leads (the ones connected to the green and red wires) to the prongs that are now visible. When you want to use your modem, take the telephone off the hook and dial through your computer.

Pete Scisco

Portable Computing

Shipping Your Equipment

How do you pack your computer equipment for a move that might involve crossing oceans in packing crates or containers? The best advice is to keep the shipping containers your components came in, including the styroform blocks that held your computer in place, but we assume that it's too late for that.

If you threw away your original packing materials, you need plastic bags, and lots of them. If you receive bags from the federal government, the heavy garbage bags will fill the bill single-strength, but if you're using regular commercial plastic bags, double or triple them so that each unit of your computer is air- and watertight. Put each component in its own bag (use zip-lock sandwich bags for the mouse and cables).

Pack everything in at least one thickness of corrugated cardboard with the highest burst strength you can find. If you're also shipping clothing, it makes excellent packing material. Just pack your off-season clothing around the computer and save some boxes. With a computer, there's nothing to leak or rub off on your clothes.

If you kept the cardboard inserts that came with your disk drives, reinsert them before moving the computer. This prevents the read/write heads in a disk drive from knocking against each other. If you threw them away, cut a piece of cardstock about the width of a computer disk and a couple of inches longer (so you can pull it out) for each drive and insert that instead. Protect the keyboard from anything that might press on the keys. Make sure you park your hard disks, if you have a way to do so. Most computers come with a Shipdisk command or a Park command. If yours doesn't, you can find these options in the form of shareware or freeware on most BBSs.

Robert Bixby

Feedback

Use a Portable Printer

Portable printers are great for producing hardcopy at remote locations, such as a construction site or summer cabin, as well as for making last-minute changes in a document when you're on the go and don't have access to a regular printer.

Mike Hudnall

Test Lab

Simplify Your Computing

Make your portable computer your main computer. If you're going to spend \$2,500 to \$3,000 on a 20MHz-386SX notebook with a 60MB hard disk, modem, and portable input device, then use it as your main CPU and storage unit.

You can always plug in your desktop monitor and keyboard. Quit worrying about transferring data, overwriting recent files, or backing up one hard disk to another. It's confusing and a waste of productive time. If that kind of portable computer is more power than you need, or costs more than you can afford, keep your laptop computing tasks as simple as possible.

Pete Scisco

Getting Started with Portable Computing

Transferring Files

Transfer only the files that you need from your desktop to your portable. Learn to use the DOS XCOPY command to distinguish the most recent file versions.

Pete Scisco

Getting Started with Portable Computing

Mirror Your Desktop

Whenever possible, you should use the same applications on your laptop as you use on your desktop system. If you're limited by disk space, use applications that are compatible. For example, you might be able to use an integrated package on your laptop for word processing and spreadsheet work, and then export your data files to the desktop.

Pete Scisco

Getting Started with Portable Computing

Carry a Boot Disk

If for some reason your hard disk refuses to come up, you'll need a way to access your information. A repair disk might also be in order, something like The Norton Utilities, which will help you fix your hard disk if the problem isn't too severe.

Pete Scisco

Getting Started with Portable Computing

Take Along a Spare Battery

This is especially true if you plan to work on any plane flight longer than two hours, or if you know you'll have a lengthy layover and hope to get some work done at the airport.

Pete Scisco

Getting Started with Portable Computing

Personal Information

Keep all telephone numbers, information service IDs, and system passwords in a separate place from your laptop. If you want to keep a computer file of these numbers, encrypt the file. If your computer is stolen or lost, you don't want someone else having access to your personal files.

Pete Scisco

Getting Started with Portable Computing

Discharge/Recharge

If your laptop uses a rechargeable Ni-Cad battery, periodically discharge the unit completely. You can use a commercial program such as Battery Watch Pro, or disable all the power savings features and leave it on until the battery runs down. If your laptop uses a rechargeable lead acid battery, ask the manufacturer about deep discharges.

Pete Scisco

Getting Started with Portable Computing

Carry a Copy of Your Warranty

If you need to have your system repaired, you might be able to get the work done for free if the system is under warranty. Carry a copy of your warranty. Don't carry the original.

Pete Scisco

Getting Started with Portable Computing

Plan Ahead

Before traveling, plan ahead. If you're going on a day trip and you know you won't be dialing into a remote service, leave your pocket modem behind. That will give you one less thing to worry about.

Pete Scisco

Getting Started with Portable Computing

Get a Commercial Transfer Product

Use cable and software to transfer files. The cost of a commercial transfer program, such as LapLink Pro or HotWire, is small compared with the time involved in copying files by swapping floppy disks. Disks can get mixed up, and you might end up copying an old file over a more recent one. If you can't afford a file transfer program, use your backup program to restore a mirror image to your laptop. Remember: Commercial software is protected by copyright, and you can only use one copy of it on one machine at a time. Consult your licensing agreement.

Pete Scisco

Getting Started with Portable Computing

Get Small

If you're pressed for space on your laptop, you might try compressing some of your data files with a shareware compression program such as PKZIP or Lharc. You'll be able to fit more data onto your hard disk and unpack the data when you need it. Be sure to leave enough room on your hard disk for unzipping and exploding files onto a floppy disk if your laptop has an internal floppy drive.

Pete Scisco

Getting Started with Portable Computing

Study the Manual

Study the Setup and Utility sections in your user's manual. Many times these sections will explain about the power-saving features in your laptop. If you have such features, always use them when you're running your laptop from batteries.

Pete Scisco

Getting Started with Portable Computing

Put Your Name in the Boot Files

Include an identity display in your autoexec.bat file. Consult your DOS manual to create a file that says something like: "This portable computer is the property of [Your Name, Address, and Telephone Number]. If found, please call. Reward." Use the Pause command to keep the message on the screen until you press a key. If you do lose your computer, chances are you'll never see it again. But you never know.

Pete Scisco

Getting Started with Portable Computing

Keep Your Serial Number

You multiply your odds of getting your lost or stolen computer back if you keep a record of its serial number.

Robert Bixby

COMPUTE's Power Tips

Identify Your Computer

Tape your business card to the bottom of your laptop. Put one inside the case. Use a luggage tag with your card on your carrying case. It might help if the two of you get separated.

Pete Scisco

Getting Started with Portable Computing

Insure Your Beast

If you use your laptop for business reasons, ask your insurance agent how you can cover it for loss, theft, or damage. (Most home owner's policies don't

cover business equipment, and those that do cover a ridiculously small portion of your computer's value.)

Pete Scisco

Getting Started with Portable Computing

Create a RAM Disk

If you have enough memory—say 2MB—it sometimes pays to create a RAM disk and then copy an application (a small word processor, for example) or data files to it. Reading data from memory is less of a drain on system resources than reading from a disk. Be sure to copy your data back to a floppy disk or hard disk before you shut down.

Pete Scisco

Getting Started with Portable Computing

Compute Remotely

Consider remote computing. If your desktop and laptop computers are each equipped with a modem, you should think about setting up your desktop machine so that you can dial into it for files while you're on the road. With some remote computing programs, you can actually issue commands from a remote site to your desktop computer. Keep in mind, though, that running programs from long distance can get expensive.

Pete Scisco

Getting Started with Portable Computing

Use an Information Service

If you need to store files temporarily to make room on your laptop, upload them to yourself via CompuServe, GENie, America Online, or some other information service. Then, when you get home, you can download the files to your computer. You can also use an information service as a kind of backup for important data files when you're traveling.

Pete Scisco

Getting Started with Portable Computing

Carry a Long Cord

Travel with an extra long telephone cord. Chances are good that your hotel has placed your phone jack under the bed, which it has bolted to the wall. Un-

less you want to work from the floor, it's a good idea to extend your reach. Twelve feet ought to do it.

Pete Scisco

Getting Started with Portable Computing

Check Printer Compatibility

If you'll be using a printer at the other end of your journey, make sure your laptop software is compatible and has the right drivers. Almost all software can print to an Epson-compatible printer, and almost every printer can emulate an Epson.

Pete Scisco

Getting Started with Portable Computing

Don't Fear the X-Ray

It's all right to put your portable through the X-ray machine at the airport. But don't carry floppy disks through the metal detector. The magnetic field might corrupt the disks.

Pete Scisco

Getting Started with Portable Computing

Keep Your Hands on Your Computer

Never leave your laptop unattended on a table, counter, or seat. It will be the last time you see it.

Pete Scisco

Getting Started with Portable Computing

Back Up and Back Up Your Backups

If you're carrying very important data—like a do-or-die presentation—make sure you have backups. Either pack a backup copy on a floppy disk in your luggage, or upload a copy to a bulletin board where you can get to it. If the data can be printed, take a hard copy with you. Leave a copy with someone at work or at home—they can fax it to you in case of an emergency.

Pete Scisco

Getting Started with Portable Computing

Chapter 11

Graphics and Desktop Publishing

It's the story of the ugly duckling. The odd, out-of-place fledgling grows up to become a beautiful swan. Desktop publishing (DTP) was a fledgling technology in 1985—everyone talked about it, but few understood its potential. Now, of course, it's a fairy-tale success story. Where will it end? Surprisingly, right back where it started. Desktop publishing, as we know it, will eventually disappear from view—a victim of its own success. The technical gains that DTP pioneered are quickly becoming standard features on the office—and even home—PC. WYSIWYG (What You See Is What You Get) has become the norm for Windows programs, as have the multiple typefaces that spice up our screens and documents. High-resolution graphics (including the new 24-bit color cards) and large-screen monitors are filtering down to the rest of us and moving across to other applications. The once high-end laser printer is now available for less than \$1,000, and 300-dpi output has become the new office standard. More and more, the techniques and technologies of desktop publishing are becoming the techniques of everyday PC computing.

In this chapter you'll find out how to

- Use fonts and clip art tastefully
- Scan in art
- Get the most out of your graphics programs
- Avoid the pitfalls that trap amateurs
- Use color
- Lay out a book

Buy a WYSIWYG Word Processor

The techniques and technologies of desktop publishing are becoming the techniques and technologies of everyday PC computing. The notion of a separate DTP area is gradually slipping away, and quietly—without any fanfare—we're all becoming desktop publishers. That's the real desktop publishing revolution. And it's a turn of events that no one could have predicted in 1985. You don't need a dedicated desktop publishing package to do 90 percent of desktop publishing. Just get a good WYSIWYG word processor.

David English

Getting Started with Desktop Publishing

Watch Those Fonts

Don't use too many different fonts on a page. At first, it's hard to resist using 4 or 5 or even 12 different typefaces at a time—so go ahead and try it a couple of times. But get it out of your system (your system, not the computer's). The ransom-note look doesn't work with most documents, so practice restraint and stick to two or three typefaces per document.

David English

Getting Started with Desktop Publishing

Surprise and Entertain

Surprise your readers. While a consistent look is important for your document as a whole, don't be afraid to place a graphic across several columns or at an unusual angle in order to grab your reader's attention.

David English

Getting Started with Desktop Publishing

Learn Your Special Characters

Many Windows programs, including Aldus PageMaker and Microsoft Word for Windows, let you use a typeface's alternate keys. Hold down the Alt key; then type 0 and the ANSI number for the special key. For beginning double quotation marks, type Alt-0147. For ending double quotes, type Alt-0148. A beginning single quote is Alt-0145; an ending single quote (also an apostrophe) is Alt-0146. An em dash is Alt-0151, and an en dash is Alt-0150. Now your documents won't look as though they were composed on a typewriter.

David English

Getting Started with Desktop Publishing

Make Your Document Letter Perfect

Don't forget to check for grammatical and spelling errors. Your document not only has to look good—it has to read well, too. Read it out loud to yourself; then have another person read it to you.

David English

Getting Started with Desktop Publishing

Use High-Quality Paper

Use the best-quality paper you can for your final printouts. Better-quality paper will hold the toner (or ink) better and make your text and graphics look sharper and more detailed. If you're using a dot-matrix printer, you might set aside a newer ribbon for your final printouts and use your older ribbon for draft printouts.

David English

Getting Started with Desktop Publishing

Have Fun

Feel free to experiment. You're designing with a computer, so it's easy to start over. Try out several versions at once.

David English

Getting Started with Desktop Publishing

Keep It Simple

Keep it simple. Desktop publishing and graphics design programs continue to become more sophisticated, but the rules of communication remain the same—a straightforward message is the most effective.

William Harrel

Getting Started with Desktop Publishing

Use Relevant Graphics

Create and select images that relate to your topic. Many novice desktop publishers tend to use graphics simply because they're there, rather than to help convey the intended message of the publication. Don't, for example, use cutesy animal images on a brochure designed to sell computers.

William Harrel

Getting Started with Desktop Publishing

Keep Your Images in Perspective

Use image colors and sizes consistent with your message. Images should enhance the message, not detract from it or show off your talents. Talent is important—but secondary. Color in most documents is used for emphasis. Too much color or the wrong color can actually work against the overall publication. Oversized graphics dwarf the message.

William Harrel

Getting Started with Desktop Publishing

Save Time with Canned Art

Use clip art. Nowadays there's a diverse collection of high-quality clip art available to desktop publishers. Even if you do draw, using a computer to create pictures such as people and landscapes isn't easy. Clip art is easily edited in graphics programs. It can save you a lot of time.

William Harrel

Getting Started with Desktop Publishing

Use White Space to Your Advantage

Don't be afraid of white space. A mistake many new desktop publishers make is thinking unused portions of a page are wasted. White space is a breath of fresh air on the page. The page is easier to look at and less intimidating.

William Harrel

Getting Started with Desktop Publishing

Use Screens

Screens are graphic elements where toner or ink dots are fewer and farther apart, giving the illusion of shades of gray. Screens are measured as percentages of black, such as 10 or 40 percent. When using color, screens make colors lighter, giving you more design options.

William Harrel

Getting Started with Desktop Publishing

Use Boxes Sparingly

Use boxes and shaded boxes sparingly. Setting text and graphics off in boxes works well for separating special elements of your document, such as sidebars. These devices tell the reader the information is separate or of special importance. Overuse of boxes deemphasizes elements and clutters the page.

William Harrel

Getting Started with Desktop Publishing

Use Special Elements Appropriately

Use dropcaps, raised caps, and decorative first letters wisely. Even though decorative caps do serve a purpose (they indicate the beginning of a new story, section, or chapter) and look nice in some documents, sometimes they aren't appropriate. You shouldn't, for example, use a decorative French letter entwined in ivy vines for a corporate newsletter. This type of graphic is better suited to a book of poetry.

William Harrel

Getting Started with Desktop Publishing

Watch for Overuse of Special Elements

Use drop shadows and other three-dimensional elements sparingly. These enhancements are effective for emphasis. If you use them on all or most of the elements in your document, nothing gets emphasized.

William Harrel

Getting Started with Desktop Publishing

Explore Your Options

Learn to use your graphics program's advanced features. Most of today's paint and draw programs have a powerful array of special effects, such as graduated fills, radial fills, extrude, blend, and envelope. But don't try to put all these effects on the same page—or in the same document, for that matter.

William Harrel

Getting Started with Desktop Publishing

Bleed in the Gutters and Margins

Use bleeds for impact. A bleed is a graphic element or photograph that's printed out to the very edge of the paper. Bleeds give your documents a dramatic and polished appearance. They're achieved by furnishing your printer with camera-ready art a little larger than the actual printed page will be. This costs a little more, but the effect is worth it.

William Harrel

Getting Started with Desktop Publishing

Learn to Use Color

Learn how to use color separations, overlays, and knockouts. Using color in your documents is more complicated than it seems. A print shop requires a separate page for each color. And if you're often printing one color on top of another, you'll have to knock out the bottom color where the top color prints over it. You can't, for example, print yellow over black without the black showing through.

William Harrel

Getting Started with Desktop Publishing

Work to Your Resolution

Match your graphics to the final output. Many desktop publishers use laser printers only for reviewing drafts. The final camera-ready art is played out on a high-resolution PostScript image setter. The difference between an image setter and a laser printer can be 900 or even 2200 dots per inch (dpi) resolution. A 300-dpi laser printer can't handle screens and fills as well as an image setter. Often, what looks very good at 1275 dpi is unacceptable at 300 dpi.

William Harrel

Getting Started with Desktop Publishing

Learn the Limitations of Your Graphics

Learn the limitations of different graphics file formats, including EPS, CGM, TIF, PCX, PIC, WPG, CDR, WMF, DRW, and ART. Graphics programs save files in a number of different formats. Some graphics are vector, and some are bitmap. Graphic formats have different limitations. Some support printer fonts, some don't. Some can print at only 300 dpi. Others are printer-dependent and can print at any resolution. Some formats don't support certain special effects.

William Harrel

Getting Started with Desktop Publishing

Paint Big, Then Reduce

Create oversize bitmap graphics. Typically, paint programs and scanners create bitmap TIF and PCX formats. You can increase the quality of these graphics by producing them larger than needed and sizing them down in your desktop publishing program. Increasing the size of bitmap graphics causes the quality to deteriorate.

William Harrel

Getting Started with Desktop Publishing

Type Should Be Legible

Text used as a graphic should be legible. Using type as a graphic or part of a graphic can be very effective for headings, logos, and other document elements. Type serves little purpose if it can't be read.

William Harrel

Getting Started with Desktop Publishing

Pick the Right Face

Suit text used as a graphic to your document's tone and audience. Different typefaces set different tones. Some, such as Cooper Black, are fun, almost cartoonish. Others, such as Times Roman, suggest seriousness and formality. When using typefaces in your graphics, use fonts that enhance the tone.

William Harrel

Getting Started with Desktop Publishing

Analyze Your Chart Use

Use the right chart for the right data. Some of your documents may require the use of charts and graphs. Use bar charts to display values within a set period. Line charts emphasize data movement with definite angles of change; they imply a carryover from one period to the next. Pie charts and 100-percent bar charts divide parts of a whole.

William Harrel

Getting Started with Desktop Publishing

Coloring Charts

Use color, shading, and fills in charts wisely. Don't use more than four colors in your charts, plus black-and-white. Too many colors can be confusing. Red, black, and brightly colored bars, lines, or sections tend to emphasize, as do darker shades of gray. Use them only when emphasis is what you're after.

William Harrel

Getting Started with Desktop Publishing

Simplify Your Charts

Avoid crowding a chart with unnecessary figures and text. The purpose of your charts is to present data in a quick and easily understood format. Charts cluttered with numbers and captions are confusing. A chart that causes the reader to look too closely has failed to do its job.

William Harrel

Getting Started with Desktop Publishing

Learn the Rules of Design

Guidelines, like rules, aren't created to be broken. However, experienced graphics artists and designers are constantly breaking these rules. So can you. But you should know what good design is—so that when you do sidestep a design guideline, you'll know when and why you're doing so.

William Harrel

Getting Started with Desktop Publishing

Laying Out a Simple Book

One of the simplest forms of books is the chapbook. Chapbooks are usually saddle-stitched and printed on bond paper with cardstock covers. Because

chapbook publishing is so simple and inexpensive, it's open to virtually everyone.

I have laid out a 40-page book in an evening using nothing more than GeoWorks Ensemble's GeoWrite. There are strong advantages to the Ensemble environment—chiefly, the wide variety of fonts that can be printed at laser quality on dot-matrix printers.

Begin by using Page Setup in the File menu to specify landscape orientation, 8-1/2 x 11 inch sheet, and two columns. Make the right and left margins .5 inch and the top and bottom margins 1 inch. Make the gutter (the space between the two columns) 1 inch.

Use Insert from Text File on the File menu to insert your edited ASCII file (all editing should be finished before the book is laid out). The next step is to allow for alternating pages. At the top of the first column of the first page, insert a page break from the Edit menu. Do the same a line above the bottom line in the second column. Insert a page break a line above the bottom of the first column on the second page and another at the top of the second column of the second page. Continue inserting page breaks in this way until you reach the end of the text. Remember that the left column should be blank on odd-numbered pages and the right column should be blank on even-numbered pages, and each page containing text should have a page break at its bottom.

You're dealing with four-page signatures—that is, each unit of your publication is a single sheet of paper which contains four book pages, two pages on each side. Therefore, you're going to want to lay out your book so that the middle two book pages will print on an even-numbered page in GeoWrite. Go to the approximate middle of your GeoWrite document, or perhaps a page or two after the middle. Be sure that it's an even-numbered page in GeoWrite. From here on, you'll be cutting and pasting whole pages.

Go to the next page in GeoWrite. Click the mouse button on the text five times. This selects the entire page, including the page break. The page breaks at the bottoms of the pages are a potential problem. Place the mouse cursor on the left end of the page break (it appears as a solid line), hold down the Shift key, and click to unselect it. Now use Cut from the Edit menu to cut the page. Go back to the blank side of the middle page. Click above the page break on that page and paste the text you just cut.

Continue this procedure, cutting successive pages and pasting them on the blank side of pages from the middle to the front of the book. As you can guess, this is the point where organization is most apt to break down.

You can't rely on GeoWrite's headers, footers, or page numbers. You'll

have to create your own and paste them into the columns. Go back to Page Setup and make the top and bottom margins one-half inch. That will give you an additional inch of space on each page. Go to the first page where you want a header and type the information at the top of the column—not in the header area provided by GeoWrite. Use the Copy command in the Edit menu to place the header in the clipboard. Then go through the book, page by page, pasting this header in place at the top of each column. Some people like to use alternating headers, and this is very easily done. Just copy one header (usually the book title) to the top of each right column and the other header (chapter name or author name) to the top of each left column. Number the columns at the bottom of the text area (not the footer area) following the flow of the text, remembering that odd numbers go with right columns and even numbers with left columns.

Print out a complete set of pages, place them back to back, and fold them in half. Read the pages in page-number order to check continuity.

Find a copy shop that can make two-sided photocopies and let the proprietor set up the material (usually every other page has to be upside down). It's worth the extra money to have the books folded in half, stapled, and trimmed.

Robert Bixby
Art Works

Reproducing on a Shoestring

In the last section I talked about a simple project called the saddle-stitched booklet. This kind of book is often called a chapbook in literary circles. This same inexpensive design is perfect for advertising material, catalogs, self-help booklets, instruction manuals, recipe books, and so on. The simplicity of the binding is what makes it so attractive. There is no more professional-looking binding that can be had for such a low cost.

I have all of my printing done by photocopying at Kinko's, a nationwide chain of copy shops. If you have a college or university in your town, you're likely to have a Kinko's, too. But there are many lesser-known companies that provide the same services. Though your pricing will probably vary, I've found that folding costs \$0.03 per fold. If a book is 40 pages long, that means I've used ten sheets of paper and the folding will cost \$0.30 per book. Stapling costs \$0.05 per staple, or \$0.10 per book. When you fold a saddle-stitched book in half, the inner pages—the ones nearest the center—will poke out a short distance from the ones nearer the cover. (Take a dozen sheets of paper

and fold them in half to see what I mean.) Many people can live with this irregularity, but for a professional look, I prefer to have the edges trimmed, which costs \$0.50 per book. For a grand total of \$1.35 per book, you'll turn ten sheets of paper into a professional-looking bound volume.

If I have one complaint about Kinko's, it has to do with the limited paper selection. If you don't like the dozen or so types and colors of bond paper available, you'd be better off going to a printer instead of a copy shop, but you'll pay more for everything. Another option is to contact Paper Direct or another source of high-quality paper. I've worked out an agreement with a print shop that they will charge me minimum rates if I bring in my own paper. That opens the wide world of paper to you. You'd be surprised to see the colors and sizes of paper available in cut-sheet form.

There are even less expensive ways to do things. A saddle-stitch stapler only costs about \$50, for example. If you intend to do 500 or more books, it will pay for itself in the savings over having the copy shop staple your books for you. You can also fold your books by hand, but my experience in this area has been that hand folding is a hit-or-miss affair. You'll often find yourself making a crooked fold. Trimming is one thing you won't be able to do adequately at home without a large investment in machinery.

So far we've talked a great deal about the production aspects of your publication: getting it on paper and binding it. But before you walk through the front door of the copy shop, you should make sure that your booklet is perfect. This involves more than simply proofreading it carefully. It also means that you need to work on the design.

If you open a book—even a simple chapbook—you'll find that there's more to a book than its body text. There's a cover, usually with the title and author on the right side (the front is on the right when the cover lies flat) and the blurbs, author bio, price, ISBN, and author photo on the left side.

You might want to have a blank sheet just inside the cover, or to save weight and money, you might want to have the inside front cover next. This will list the title of the book and the author, and if you are starting a publishing company, you might want to put your colophon on this page. A colophon is a symbol, like the little house Random House uses or Knopf's borzoi. I usually put the copyright page right on the back of the inside front cover, but many people would prefer to leave the back of this page blank. Other pages that you might want to put in the front include a table of contents (which should begin on a right page), a table of figures, acknowledgments, and a dedication (which should appear on a right page).

If you have a book whose design you admire, use it as a guide. If not, in-

vest in *The Chicago Manual of Style*, which has guidelines for putting a book together, as well as hundreds of pages of detailed instructions on formatting and proofreading.

So far, I haven't found a way to include color economically. Most copy shops with color copiers charge up to \$1 per page for color copies. The technology has to come down in price before you can start mass-producing with it. For economical color, seek out a printer with a four-color press. You could print each book individually with an ink-jet printer, but that would be very time consuming. And I haven't been thrilled with the quality of colors that ink-jet printers produce.

Robert Bixby
Art Works

Psychological Color

The pros also keep in mind the psychological effects of color. Create a feeling of depth in your work by using bright, warm colors in the foreground, and cool pale colors in the background. Red, pink, and yellow jump off the screen and should be used for elements meant to catch the eye. Some colors have definite meanings, such as red for stop and green for go, and should be used appropriately.

Steven Anzovin
Getting Started with Desktop Publishing

Presentation Graphics

There are special rules for the use of graphics and text in onscreen presentations. Large text, short words, and bold pictures work best. All images and text should be in the central 80 percent of the screen—the so-called “safe text area”—to avoid the distortion at the edge of computer monitors. Use unobtrusive backgrounds in your designs, and separate foreground text and pictures from the background through the use of color blocks and drop shadows.

Steven Anzovin
Getting Started with Desktop Publishing

Test Your Art Bound for Television

Much computer art is destined for viewing on video screens. But art that looks good on a computer monitor may look terrible on TV, which has infe-

rior resolution and color purity. Avoid thin vertical lines and fine patterns of contrasting colors, especially black and white. These will flicker badly when viewed on video. Television has trouble handling certain colors, such as bright white, fire-engine red, hot pink, and rich brown. Dark gray, off white, blue, green, and yellow are the most stable video colors—and, you'll notice, the most used in professional video graphics.

Steven Anzovin

Getting Started with Desktop Publishing

Use Antialiasing

The stairstepped edges of lines, text, and color borders in computer paintings are due to a phenomenon called aliasing, or simply the jaggies. Better paint programs offer anti-aliasing tools to smooth out the jaggies and increase the realism of your work. For example, stroking a smoothing tool over an aliased black line on a white background will add gray pixels along the jagged edge, softening the transition between black and white. Seen from a small distance, the line looks far smoother and straighter. Anti-aliasing is especially helpful for increasing the readability of text created with the text tool in paint programs.

Steven Anzovin

Getting Started with Desktop Publishing

Make Your Graphics Leap Off the Page

The variety of simulated 3-D effects you can create with a sophisticated paint program are endless. Embossed type is easy to make by pasting a text outline over itself in black and white, each outline offset by a few pixels. Paste down a copy of a drawing in black, skewed and flattened, to create a shadow. Some programs offer perspective distortions, so that your drawing can be made to appear as though it's projected on a wall receding into the distance. Text and pictures can be filled with any texture you can scan or draw. For example, try putting rippling waves into the word water or Monument Valley into the word western. Text can be distorted with special filters that make it appear to be floating on the surface of a placid lake or spinning in the eye of a whirlwind.

Steven Anzovin

Getting Started with Desktop Publishing

Keep Tables Spare

Drawing programs are often used to create data graphics such as charts and tables. Your data graphics will look more professional and communicate more clearly if you include only the data you need and delete extraneous information; avoid mixing several chart types in one graphic (a pie chart with a bar graph, for example); and use the fewest number of different text styles, colors, and symbolic elements that will get your message across.

Steven Anzovin

Getting Started with Desktop Publishing

Proper Scanning

Getting the best-quality scans from your scanner takes care and skill. Align the original squarely on flatbed scanners so horizontal and vertical lines look straight and smooth on the preview scan. Use tape to hold the original art in place if necessary; some people use Post-It notes for this because the glue doesn't leave a mark on the scanner's glass platen. If you're using a handheld scanner, you can get straighter scans by moving the scanner along the edge of a ruler or book. When scanning color art with a gray-scale scanner, lay a piece of clear yellow or orange plastic over the original. This trick often helps to boost the contrast level in the scan.

Steven Anzovin

Getting Started with Desktop Publishing

Tracing

A scanner is the easiest way to input line art on paper into your computer, but if you're willing to spend some time tracing, there is another way. If you can't get access to a scanner or drawing tablet and stylus, try copying the art onto transparency stock with a photocopier (Avery makes transparency film that is compatible with photocopiers and laser printers). You can use the photocopier to scale the art so it fits comfortably within a 14-inch diagonal rectangle. Then run a paint or drawing program, tape the transparency onto the screen of your monitor, and carefully trace under it with the mouse. When you're finished, remove the transparency and clean up your drawing.

Steven Anzovin

Getting Started with Desktop Publishing

Overhead Transparency Rules

Here are a few tricks for producing good-looking overhead transparencies from your graphics. Use large, thick type and art—they won't get washed out by the light of the overhead projector. Use a good quality office copier to copy printed graphics to transparency film. Good copiers print denser blacks than many dot-matrix or laser printers can. But print color transparencies directly on a color printer. Try printing two copies of the transparency and layering them in a matte to get the densest blacks and colors.

Steven Anzovin

Getting Started with Desktop Publishing

How to Get Slides

If you need slides of your work for use in a presentation or for color desktop publishing, you can send your graphics files to a slide service bureau and get back top-quality slides at a fairly steep price. But before you do that, try taking the slides yourself right off your computer screen. You'll need a dark room, a 35mm camera with a zoom lens and manual shutter, a cable release, a roll of Kodak Ektachrome or other color slide film, and a tripod. Display your picture, hiding any menus or toolboxes, and clean off the surface of the screen. Set up the camera so it's exactly level with and at least six feet from the center of the screen, then zoom in until the screen fills the viewfinder. Set the shutter at half a second and snap away.

Steven Anzovin

Getting Started with Desktop Publishing

Mouse Alternatives

Lots of computer artists are happy with a mouse, but many serious artists invest in a drawing tablet, a sensitized surface that can be drawn upon with a stylus similar to a pen. A stylus is a more natural tool for drawing and makes possible certain actions, such as drawing freeform curves and signing your name, that are quite difficult with a mouse. The latest drawing tablets are pressure sensitive, so with compatible software you can change the action of the current drawing tool by bearing down or letting up on the stylus. Trackballs, by contrast, are good for moving a pointer but nearly useless for drawing.

Steven Anzovin

Getting Started with Desktop Publishing

Inexpensive Color Printing

Until recently, inexpensive and good quality were mutually exclusive terms when it came to color printing of computer graphics. Now color printing is finally becoming affordable. For example, Hewlett-Packard's DeskJet 500C (800-752-0900; \$1,095) can print out drawings and paintings on plain paper or transparency stock at up to 300 dots per inch and with thousands of colors. For better color than the DeskJet can provide, seek out a local color printing service bureau that can print out your work on a high-end color printer. To make many copies of color art without using a service bureau, use the color copier at your local copy center. Color copies currently cost under a dollar and can be made from slides as well as paper. Lots of small desktop publishers put out limited runs of color brochures and newsletters that way with minimal hassle and expense.

Steven Anzovin

Getting Started with Desktop Publishing

Choosing Appropriate Clip Art

Consider the tone of your publication and choose your clip art accordingly. Some clip-art packages contain lighthearted cartoons that are perfect for office or club newsletters. Other packages contain traditional illustrations that are appropriate for more conservative publications. Choose a package that matches your material and your audience.

David English

Getting Started with Desktop Publishing

Look for Specialized Clip Art

If your publication covers a particular area—such as medicine or sports—look for clip-art packages that specialize in your area. If your scope is more general, look for packages that offer a variety of images. The key word here is variety—you'll be surprised by the kind of offbeat images that you'll use. (Some day you'll really find a place for that drawing of a lizard.)

David English

Getting Started with Desktop Publishing

Use Clip Art Compatible with Your Paint Software

Check to see that the clip art is available in a graphics file format that's compatible with your applications and printer. If not, do you have an application or conversion program that can convert it to a format you can use? Most desktop publishing programs can handle most file formats, but if you want to alter an image, be sure that your draw or paint program can import it.

David English

Getting Started with Desktop Publishing

Try Different Formats

Experiment with both vector and bitmapped clip art. If you plan to print your document at 1270 or 2540 dpi on a Linotronic printer, you'll want to favor the vector formats (especially EPS). If you plan to print with a dot-matrix printer, you should favor the bitmapped formats (such as PCX and TIF). If your printer is a 300-dpi laser printer, you can use either.

David English

Getting Started with Desktop Publishing

Glossary

24-bit color. A method of storing and displaying computer-based graphics that allows 16,777,216 colors to be shown at a time.

8514/A. The 8514/A graphics card, introduced in 1987 with the PS/2 line of computers, provides an interlaced screen with a resolution of 1024 x 768 pixels. At this resolution, it provides 256 colors. Currently, it is only one of many ultra VGA designs trying to establish themselves as standards. Since the 8514/A hardware is expensive and very few programs make use of it, most users have been content with the various flavors of Super VGA.

active matrix. A type of LCD display that uses a transistor—or three transistors in the case of a color LCD—to drive each pixel. The brightness, contrast, and refresh rate for active-matrix LCD screens is generally on a par with standard CRT (Cathode-Ray Tube) monitors. See also *LCD* and *passive-matrix*.

address space. This is the amount of RAM a CPU can “see.” An 8088 can address as much as 1MB, an 80286 as much as 16MB, and an 80386 as much as 4096MB of memory.

address. The location of an individual cell in a spreadsheet, usually given in A1 address style (A1, A2, A3,...) or R1C1 address style (R1C1, R1C2, R1C3,...). Also known as reference. See also *column heading* and *row heading*.

analog. An audio signal whose fluctuating voltage pattern reflects the structure of the original sound. See also *digital*.

ASCII. American Standard Code for Information Interchange. ASCII is a standard for

COMPUTE Magazine's Power Tips

relating numbers to alphanumeric characters and symbols. Standard ASCII is a 7-bit code, which means there are 128 possible values. The first 128 symbols in the PC's character set are standard ASCII. The next 128 characters are specific to the PC and are often referred to as the extended character set.

AUX. Auxiliary. AUX is another way in DOS to refer to communications port 1 or COM1.

band. A portion of a graphic sent to the printer. The term banding describes the horizontal lines in dot-matrix graphics output.

bandwidth. Although this is technically the frequency range of a communications channel, it is often used as a relative measure of a channel's capacity to transfer information. The greater the capacity, the greater the bandwidth. For example, a 16-bit bus has greater bandwidth than an 8-bit bus.

BASIC. Short for Beginner's All-purpose Symbolic Instruction Code. A high-level programming language that uses English-like commands. Because BASIC is relatively easy to learn, it's often used in beginning programming classes.

batch file. A text file that contains a sequence of commands supported by a batch command language.

baud. Baud is a measure of the speed at which bits of information are sent or received over communications lines such as those used with a modem. Although the two don't mean the same thing, baud and bits per second (bps) are used interchangeably.

BBS. Bulletin Board System. A BBS offers a convenient way to communicate with fellow computer enthusiasts and acquire copies of programs, picture files, and so on via a modem. The programs available on BBSs are usually shareware, which means you can try a program before you buy it.

bells and whistles. Features, often of limited value, that are indiscriminately added to a program.

BIOS. Basic Input/Output System. The set of routines in a PC's ROM chip that allows DOS to communicate with the computer hardware. The primary ROM instructions for a PC, hard drive, video card, and so on.

bogus. Something that's false or doesn't work correctly. A person who is false or doesn't work well is called a *bogon*.

boot. To start up a computer. Also, the process of starting up a computer.

brain-damaged. Programs that behave rudely or strangely are brain-damaged.

bug. Something that causes a program to crash or hang. The first bug was a real bug—a moth—that caused an early model computer to act strangely.

bum. To enhance code by making it smaller. This is unfortunately a lost art.

cache. A cache is a special program that uses part of your PC's RAM to store the information your disk uses most often. With a cache, when the system requests data from a disk, there's a good chance the data (or part of it) will be in the cache. Since RAM access is much, much faster than disk access, a cache can make disk-intensive applications fly.

CD-DA. Short for Compact Disc-Digital Audio. Also known as Red Book audio. The CD-quality audio that comes directly from a conventional audio CD or CD-ROM.

- CD-ROM.** Compact Disc-Read Only Memory. A five-inch plastic disc that can hold as much as 650 megabytes of computer information. A device that can read a CD-ROM disc is called a CD-ROM drive. A CD-ROM drive that meets the MPC standard is capable of delivering data at a sustained rate of 153kb per second. CDs have been popular for several years as the medium of choice for sound recording, and they're fast becoming an important medium for storage for computers. Although the CD's optical technology doesn't easily lend itself to erasing and rewriting, its huge capacity makes it invaluable for storing large amounts of data.
- cell.** The basic unit of a spreadsheet. Cells are formed by the intersection of rows and columns and can hold data, formulas, or both.
- CGA.** Color Graphics Adapter. IBM introduced the CGA card as a way to bring color graphics to the PC. For its 320 x 200 pixel graphics screen, it added pink and powder blue to the already perfected black-and-white. CGA also provides a 640 x 200 pixel high-resolution graphics screen in black-and-white and text in 16 colors against a background that can be displayed in 8 colors.
- check box.** A special type of interactive control that allows a user to enable or disable one or more options. When an option is selected, an X or a check mark appears in the box. See also *option button*.
- cluster.** The File Allocation Table maps groups of sectors called clusters. A cluster is the minimum amount of storage space a file can use. For this reason, each file on a disk takes up at least one cluster. On 360K floppy disks, a cluster is two sectors or 1K. On an average hard disk, a cluster is four sectors or 2K.
- column heading.** A heading that identifies a vertical group of spreadsheet cells. The heading is placed at the top of the cells. Column headings are usually labeled in A1 style (A, B, C) or R1C1 style (C1, C2, C3 or 1, 2, 3). See also *row heading*.
- COM.** Communications. This is a DOS device name used in connection with serial ports and is usually reserved for communications with a modem. There are, however, serial printers, for example, that must be connected to the computer through a serial port. To connect a serial printer to the computer, the MODE command is used to tell the system where to find the printer. With DOS 3.3 or higher, four communications devices may be specified on one system, COM1 through COM4. Unfortunately, only two interrupts have been set aside for use with COM ports: 3 and 4. Interrupt 4 can be used with COM1 or COM3 and Interrupt 3 can be used with COM2 and COM4. Therefore, you can't use both COM1 and COM3 at the same time or COM2 and COM4 at the same time.
- command line.** The DOS command line is the familiar A> prompt. When you type commands at the prompt, the command interpreter, command.com, executes them or tells you their syntax is incorrect.
- compile.** The process of converting a program's source code from a high-level language into executable machine code. A program that performs this task is called a compiler.
- compiler.** A compiler translates an entire file of source code into pure machine language. When you run a compiled program, the entire program loads into memory and executes.

COMPUTE Magazine's Power Tips

computer literacy. The ability to understand and effectively use computers.

CON. Console. CON refers to the keyboard and monitor. When you're using CON for input, it refers to the keyboard. For example, Copy CON > myfile.txt copies everything you type at the keyboard up until a Ctrl-Z and writes it to the file myfile.txt. When used as output, CON refers to the screen. If you want to view the file you just created, you could view it with Copy myfile.txt CON.

conventional memory. Conventional memory is simply the first 640K of memory. The 384K of memory between the 640K barrier and 1MB (called UMB, or upper memory) is reserved for DOS, but a portion of this memory can be accessed as expanded memory with the appropriate hardware.

CPU. Central Processing Unit. This is the computer's brain, which controls the machine's resources and manages calculations. In the PC, the CPU is a micro-processor chip from the Intel 80x86 family, which includes the 8088, 8086, 80286, 80386, and 80486. CPU is also used to refer to a PC's system box (the part of the machine that houses the CPU, memory, and disk drives).

crash and burn. To fail or hang in a spectacular way.

DDE. Short for Dynamic Data Exchange. A communications link used in Windows and OS/2 that allows two or more programs to exchange information and commands.

device driver. Device drivers are essentially special TSRs that handle the input and output between peripherals such as printers or mice and the CPU of a computer. The standard device drivers include drivers for the keyboard, serial and parallel ports, and disk drives. You can install device drivers in your config.sys file with lines that begin device=.

device. Any peripheral connected to a PC such as a mouse, printer, print buffers/spoolers, expanded memory boards, and so on can be called a device. You usually tell your PC's system about devices by installing device drivers in your config.sys file.

dialog box. A special type of interactive window that allows a user to respond to a program. A dialog box typically contains controls such as check boxes or option buttons. See also check box and option button.

digital. An audio signal that has been converted into numbers that no longer directly reflect the structure of the original sound. See also *analog*.

dimensional. The term is combined with two- or three- to indicate whether a spreadsheet is able to establish links among worksheets: 3-D spreadsheets can do it; 2-D spreadsheets cannot. The term 3-D applies also, of course, to the graphic effects (3-D bar graphs, for example) available in spreadsheets. See also *link*.

DIP. Short for Dual Inline Package. A memory-chip housing with metal pins that are inserted into circuit-board sockets.

docking station. Also known as expansion chassis. An external box that allows a laptop computer to add a combination of expansion slots and drive bays.

DOS. Disk Operating System. Although it does much more than just manage disks, that's DOS's primary job. There are several varieties of DOS for PCs, including MS-DOS (Microsoft), PC-DOS (IBM), and DR DOS (Digital Research).

- dot-matrix.** A dot-matrix printer is one that produces printouts by driving tiny hammers (called pins) against an inked cloth ribbon, leaving little dots on the paper beneath, from which graphics or text is formed on the page.
- dpi (dots per inch).** A standard for printer resolution that measures the number of dots a printer can place along a linear inch. Laser printers are typically rated at 300 dpi. You should realize, however, that this resolution is not necessarily an indication of print quality, as 300-dpi laser output looks better than 360-dpi dot-matrix output. See also *ppi*.
- draft quality.** The lowest print-quality setting of a printer. Because the printer puts less ink on the page, this is usually the fastest print mode. Most often associated with dot-matrix printers.
- DRAM.** Short for Dynamic Random Access Memory. A type of computer memory that can hold information for only a short period of time. To maintain its contents, a DRAM chip needs to be refreshed with an electric charge hundreds of times a second.
- drill and practice.** A term, sometimes used pejoratively, that describes a kind of educational software. Like flashcards, drill-and-practice programs use repetition and reward to reinforce learning.
- DTP.** DeskTop Publishing. Desktop publishing is a term often attributed to Paul Brainerd at Aldus (though there are much earlier examples of its use) to describe the ability of an individual to create a typeset page at his or her desk, thus marrying the jobs of editor, typesetter, layout artist, and printer. With so many responsibilities, the desktop publisher must have multiple skills because amateur efforts in any of these areas stand out even to the untrained eye.
- EGA.** Enhanced Graphics Adapter. A marked improvement over the CGA adapter, EGA can display 16 colors on a graphics screen of 320 x 200, 640 x 200, or 640 x 350 pixels. Although originally released in a configuration that only provided 16 colors on a 320 x 200 pixel screen, this limitation was overcome in response to consumer demands.
- EMS.** Short for Expanded Memory Specification. A technique developed by Lotus, Intel, and Microsoft that allows 8088, 8086, 80286, 80386, and 80486-based systems to access more than 640K. The most common versions are the first-generation EMS 3.2 and the third-generation LIM 4.2. See *expanded memory*.
- emulation.** The ability of a printer to mimic the functions of a similar, but incompatible, printer. Many printers contain the code to emulate one or more standard printers, such as an Epson FX-80, a Hewlett-Packard LaserJet, or an Apple LaserWriter Plus.
- EPS.** Encapsulated PostScript. This object-oriented graphics format contains all the code necessary to print a graphics file on a PostScript printing device. GIF. Graphic Interchange Format. This graphic standard was developed by CompuServe to provide a standard graphics format for online services. It is a compressed bitmapped format.
- event-driven programming.** A type of programming in which the program continually tests for a set of events.
- expanded memory.** Introduced in 1985 by the consortium of Lotus, Intel, and Micro-

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soft, expanded memory is a way to expand a PC or AT beyond 1MB of memory. The memory manager (a chip set that supervises expanded memory access) is given a handle by a program to tell it where some information lies in the memory above 1MB. When the request is made, the memory manager maps that portion of memory to four 16K regions in high memory for easy program access. The system works a little like a RAM disk with a maximum capacity of 8MB (with LIM EMS 3.2) or 32MB (with LIM EMS 4.0).

extended memory. Memory that can be used by 80286, 80386, and 80486-based systems. Programs must be specially written to use extended memory. With a memory-management program, 80386 and 80486 systems can use extended memory to simulate expanded memory. Technically, extended memory is any memory beyond the base 1MB of memory accessible by the 80286 and the 80386 operating in real mode. An AT can access memory above 1MB directly through the use of a RAM disk. DOS provides the means of creating a RAM disk with device drivers such as vdisk.sys and ramdrive.sys. Other uses for extended memory include disk caching and expanded memory emulation. Windows directly accesses this memory.

FAT. File Allocation Table. The FAT is an area on a DOS disk that comes directly after the boot record. It contains information on all the sectors on the disk, and it maps the location of every file on the disk.

feature. A desirable attribute of software. Often used sarcastically to refer to bugs in a program that can't be fixed. For example, "Oh, yeah, that screenful of garbage is a feature." or "That's not a bug, that's a feature."

file attributes. Each file on a disk is marked as Read Only, Hidden, System, Archive, or a combination of these. These file attributes are located with the other file information in the directory. With DOS's Attrib command, you can alter a file's attributes.

flaky. Said of programs and people. If they're erratic, they're flaky.

flame. To talk endlessly, and usually boringly, about something. Also to insult someone online.

floppy. Floppy disks are thin, round, flexible disks housed inside a 5-1/4-inch flat plastic housing. The sturdier 3-1/2-inch disks are also referred to as floppies.

font. Technically, a font is an individual typeface in a particular style and of a particular size. An example of a font is Times-Roman 12-point bold oblique. In computer and desktop publishing parlance, Times-Roman is often called a font. Owing to the magic of scalable outline fonts, an individual character can be changed almost infinitely in size from about 4 points to something in the hundreds of points, allowing variations of tenths or hundredths of points in between. Italic (or oblique) type, boldface, underscore, and several other variations are called typestyles. Purists are disdainful of these corruptions of the ancient language of typesetters.

foo. From foobar, which is a corruption of fubar, a World War II acronym for Fouled Up Beyond All Recognition, or a slight variation thereof. Foo and Bar are traditional programming variable names.

formula. A statement that describes a mathematical calculation. Formulas in spread-

sheets are linked to individual cells, though they often refer to data and formulas in other cells, allowing a user to perform what-if calculations.

fry. Synonym for crash and burn.

function. A spreadsheet calculation tool that allows you to perform decision-making and value-returning operations automatically. One frequently used function is SUM. It sums a group of numbers. IF is a function that permits you to test a value and take action based on the result of that test. label (text). A text string often used as a column or row heading.

G. Abbreviation for gigabyte; 1 billion bytes.

game port. Game ports are for joysticks, and joysticks are most beneficial when used with arcade games. The game port may allow the use of one or more joysticks. Some cards come equipped with a game port. Most game ports are the 15-pin variety.

glitch. A bug.

gray scale. The progressive series of grays that a device can produce, ranging from black through white. The quality of the gray scale is dependent on the video controller (usually CGA, EGA, or VGA) and video display (usually 16, 32, or 64 gray-scale LCD).

grok. To understand in a deep way. From Heinlein's book *Stranger in a Strange Land*.

hacker. The word comes from the Tech Model Railroad Club at MIT in the 1950s. A neat addition to a railroad was a hack. The term moved to computer jargon, where a neat programming feat was a hack. A hacker creates hacks. Hacker is used incorrectly by the popular press to mean people who break into computer systems via telephone.

Hercules Graphics Adapter. The Hercules Graphics Adapter, also known as the HGA, is a modification of the MDA standard that allowed the card to display very clean monochrome graphics at a resolution of 720 x 348 pixels as well as the crisp, clear character set of the MDA. This adapter dates from 1982. Interestingly, the Hercules Graphic Adapter was developed by Van Suwannukul so that he could write his doctoral thesis with the Thai alphabet.

HMA. High Memory Area. High memory is the first 64K of extended memory. By a quirk in the design of 80286 and 80386 processors, this memory is directly accessible in real mode.

Hz. Short for Hertz. A unit used to measure the frequency of a vibrating object, such as a violin string or the cone in a speaker. Also known as cycles per second. The human ear can hear from approximately 20 Hz to 20 kHz (20 to 20,000 Hz).

icon. A small onscreen image that can be manipulated in order to control a program. For example, clicking the mouse pointer on a printer icon might send a picture to the printer.

IFF. Interchangeable File Format. IFF is a bitmapped format that's the standard graphics format on the Amiga and is also used on the PC by DeluxePaint.

ink-jet. Ink-jet printers spray an image on paper in tiny droplets of ink. Though they are billed as producing printouts indistinguishable from those of laser print-

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- ers, the tendency for the ink-jet nozzles to become clogged often results in telltale horizontal white lines through the image.
- interactive program.** A program that accepts responses from a user, typically through the keyboard, a mouse, or a joystick.
- interface.** A connection between two elements. In software, the specific type of design and commands that enable a person to control a program.
- interlaced.** Many VGA screens achieve higher resolution by interlacing. An interlaced screen is drawn twice. First it's drawn in one position, and then it's shifted about half a pixel and redrawn. Using this technique, it's possible to multiply the resolution of a monitor. In computers, the interlaced screen appears to jump slightly, as if it has the jitters. This irritates some people and makes the interlaced screen unacceptable for word processing and other detail work.
- interpreter.** An interpreter translates one line of source code at a time and executes it. BASIC is the most popular interpreted language, though most modern BASICs can be compiled.
- jaggies.** The saw-blade (or stairstep) appearance of slanted or curved lines on a computer screen or printout. Jaggies occur because you're trying to print a line that is not perfectly straight and either perfectly horizontal or perfectly vertical—the only kind of lines a raster device can create.
- jock.** This term used to signify someone who employed brute-force methods to solve programming problems. Today, a jock is an expert programmer.
- K.** Abbreviation for kilobyte. Although kilo means 1000, 1K is actually 1024 bytes. Early PCs came with 4K or less. The standard for 8088-based PCs is now 640K, for 80286s it's 1MB, and for 80386s it's 2MB or more. As with money, you can never have enough RAM.
- kludge.** Pronounced "kloo-j," this is a software or hardware patch that works but is conceptually (and sometimes physically) ugly. Kludge is also used to refer to a program that is full of this sort of programming.
- laptop computer.** A portable computer, usually able to operate from either batteries or AC power, that offers most or all of the functionality of a desktop computer. Laptop computers are generally considered to be portable computers that weigh 8 to 15 pounds, but the term is also used generically to refer to any portable computer, including a notebook computer, that weighs less than about 18 pounds.
- laser printer.** A type of printer that uses the electrophotographic method used in copy machines to place images on paper. Laser printers print an entire page at a time and offer very high quality. Laser printers use the laser beam to charge a light-sensitive coating on a drum. The drum is then exposed to charged toner particles that cling to the drum. Paper with an even greater electrical charge is moved past the drum, and the particles leap from the drum to the paper, which is then heated to a temperature high enough to melt and bond the toner particles to the paper.
- laser.** Laser is an acronym standing for Light Amplification through Stimulated Emissions of Radiation. It's a very dense, concentrated light beam capable of crossing great distances with little degradation of power. Lasers are at the heart of

much of the most exciting computer technology, and they may soon drive computers themselves. They are the power behind bar code readers that have affected our daily lives from the checkout counter at supermarkets to the recordkeeping technology at hospitals. Lasers have even been put to use in optical mice, laser printers, and hand scanners for importing graphic images.

LCD. Short for Liquid Crystal Display. A type of computer display that sandwiches a liquid compound between two transparent electrodes. LCD screens are found in the vast majority of laptop computers because they consume less power than a standard CRT monitor.

link. A connection between spreadsheets, with data in one affecting data in another.

Logo. A programming language designed especially to teach children to program. It was developed by Seymour Papert at MIT in 1968.

LPT. Line PrinTer. This DOS device name specifies which port is used to connect a parallel printer to the computer. As many as three line printers can be installed on one system: LPT1, LPT2, and LPT3.

macro. A series of commands recorded and saved for future playback. Use of macros can improve the speed and accuracy of spreadsheet work.

MB. Megabyte. A megabyte is equal to 1,048,576 bytes, or 1,024K. Memory on large systems and storage for most hard disks are measured in megabytes; 1024MB is equal to one gigabyte or 1G.

MCGA. MultiColor Graphics Array. The MCGA was introduced to provide a colorful graphics display for the low-end PS/2 machines. It's capable of producing graphics of 320 x 200 pixels in 256 colors from a palette of 262,144 colors.

MDA. Monochrome Display Adapter. Introduced with the PC in 1981, this display adapter could only display text, though the text it displayed was very clear. The reasoning behind this decision was that the PC was aimed at business users and business persons were not interested in displaying graphics. It failed to revolutionize computer graphics and was quickly supplanted by the Hercules Graphics Adapter as the monochrome adapter of choice. If it had been capable of displaying graphics, it would have displayed 720 x 350 pixels.

megabyte. See MB.

MHz. Megahertz. A megahertz is 1,000,000 cycles per second. Megahertz is used as the measure of a microprocessor's speed. The first IBM PC ran at 4.77 MHz. The new 80386 and 80486 chips run at 33 MHz or faster. See Hertz.

mickey. See *PPI*.

MIDI. Short for Musical Instrument Digital Interface. Pronounced "middy." A digital communications protocol that allows electronic musical instruments and computers to communicate with each other. Because MIDI sends performance information (such as note on, note off, pitch change, and volume), rather than actual musical sounds, it's a highly efficient way to store and transmit musical data.

modem. MOdulator-DEModulator. A modem converts digital data to signals that can be transferred over audio transmission lines, most commonly phone lines. There are two types of modems, internal and external. An external modem

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- must be connected to a serial port. An internal modem is a serial port and a modem combined.
- mouse.** A mouse is an input device that supplements the keyboard and was first used as a pointer in CAD, paint programs, and other graphics applications. The mouse's power and flexibility soon warranted its use in other environments such as database, spreadsheet, telecommunications, and desktop publishing. Most mice can be programmed for use with nonmouse applications.
- movie file.** A Multimedia Movie Player data file with the MMM filename extension. A movie file contains animation objects called cast members and control information called the score.
- MPC.** Short for Multimedia PC. Any computer, upgrade product, or software title that conforms to the standards set by the Multimedia PC Marketing Council.
- MS-DOS.** Pronounced "em-ess-doss." Short for Microsoft Disk Operating System. The most popular PC operating system. It oversees your PC's disk input and output, video support, keyboard control, program execution, and file maintenance.
- ms.** Millisecond. Milliseconds are commonly used to measure the speed of hard disk drives. Common speeds are 65 ms for a 20MB drive, 28 ms for a 40MB, and 14 ms for a 110MB. The smaller the number, the faster the drive.
- multimedia.** The combination of graphics, sound, animation, and video in a single software program. Sometimes only two or three of these elements are needed in order for a program to be called a multimedia program. Can also describe any PC, upgrade product, or software title that conforms to the MPC standard.
- multitasking.** In modern parlance, multitasking means running two or more programs at the same time. On the PC, the Intel 286, 386, and 486 processors can multitask in protected mode. Windows 3.0, OS/2, GeoWorks Ensemble, DESQview, and Unix are examples of PC multitasking operating systems and operating system extensions.
- nanosecond.** Used to measure the speed of memory chips. Equals a billionth of a second.
- near letter quality.** Print quality that approaches the quality of a standard office typewriter. Abbreviated NLQ.
- near typeset quality.** Print quality that approaches the quality of a typesetting printer.
- nerd.** Synonyms are weenie, technoweenie, and dweeb. Computer jocks are often called nerds by noncomputer people. This is a mistake. Because of the popular misconception, however, power users often jokingly refer to themselves as nerds. Real nerds never know they are nerds, but you can usually spot them by their pocket protectors.
- notebook computer.** A lighter and thinner version of a laptop, usually weighing less than eight pounds.
- NUL.** Null. This is a DOS device used to hide output that usually appears on the screen. It can also be used with the CTTY command to hide all standard screen output during the execution of a batch file.

- object-oriented programming.** Abbreviated OOP. A type of programming in which the program is made up of objects that interact with each other. Each object can contain one or more program routines and data structures. See also *object*.
- object.** Short for object code. A variable that contains program routines and data and is treated as a discrete entity. See also *object-oriented programming*.
- option button.** A special type of interactive control that allows a user to choose an option from a list of options. Unlike the square-shaped check box, which allows several options to be selected, the circle-shaped option button allows only one option to be selected at a time. Also called radio button. See also *check box*.
- palmtop computer.** Also known as hand-held computer. A computer small enough to be held in one hand, usually weighing less than two pounds.
- parallel port.** Parallel ports allow your computer to connect to devices such as printers that use parallel interfacing. Usually, parallel ports send information from the computer to an attached device but don't receive information. A system with one parallel port recognizes the port as LPT1. Information is processed over eight wires, and each signal arrives at the printer at the same time (that is, in parallel).
- partition.** Hard disks are divided logically into one or more areas called partitions. Prior to DOS 4.0, if you had a hard disk larger than 32MB, you had to partition your drive with the DOS Fdisk command. After partitioning, your drive will act as if it were two or more drives. The partition table is located on track 0 directly in front of the disk's boot sector.
- passive matrix.** The type of LCD display found on most currently available laptop and notebook computers. Passive-matrix LCD screens are less expensive and have less brightness, less contrast, and a slower refresh rate than active-matrix LCD screens. See also *LCD* and *active matrix*.
- PCX.** This is a standard bitmapped graphics format for the PC, developed by Z-Soft. Most PC paint programs support PCX, as do almost all bitmapped graphics applications. According to Z-Soft, PCX doesn't stand for anything, though Picture Exchange seems an obvious origin.
- pin.** One of a series of tiny electromagnetic hammers located in the printhead of a dot-matrix printer. Each pin produces a dot at a specified location on a printed line of text. See also *dot-matrix printer*.
- pixel.** Picture element. A pixel is the smallest dot of color your video card can manage. Display adapters are defined by their dimensions in pixels. On a color monitor, each pixel is actually made up of three dots: one red, one green, and one blue. Monitors are defined by the dot-pitch, which refers to the diagonal distance between two dots of the same color. A standard dot pitch is .28mm.
- PostScript.** PostScript is an interpreted computer language from Adobe Systems specially designed to make up pages, and thus it's known as a page-description language (PDL). When a page is created with PostScript, it's sent to the printer, not as a series of byte values to describe individual points on the page (which is how most graphics information is sent to printers), but as definitions of lines to be drawn, fonts to be used, and text to be printed in the specified

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fonts. These instructions are then interpreted by the printer and, through the hardware of a laser printer or typesetter, turned into a printed page.

ppi. Points Per Inch. Dissatisfied with the standard means of expressing a mouse's sensitivity to movement in terms of dots per inch (dpi), Microsoft invented points per inch. It means exactly the same thing: the number of discrete positions that the optical sensors inside the mouse can count through a mouse movement of an inch. Also known as mickeys.

Primary storage. A computer's internal memory (RAM).

print driver. A device driver that converts a program's generic printer output into the codes required by a specific printer.

printer buffer. A hardware- or software-based memory device that accepts printer data from a computer and holds it until the printer is ready for it—thus freeing the computer for other use. The process of using a print buffer is often referred to as print spooling.

PRN. Printer. This is another DOS device name used to refer to the printer connection. PRN can usually be used interchangeably with LPT.

protected mode. Protected mode is a special multitasking feature of 80286, 80386, and higher CPUs. In this mode, your PC can run Windows 3.0, and it "sees" as much as 16MB of memory at a time, all of which is accessible. Protected mode also allows the 80286 and 80386 machines to access the hard disk as if it were RAM. DOS runs in real mode, not protected mode.

RAM disk. A portion of memory that's set aside to simulate a disk drive. Though faster than a mechanical drive, its contents are lost when the computer is switched off. Also known as a RAM drive, virtual disk, or electronic disk. To install a RAM disk on your PC, you put a command like Device=Ramdrive in your config.sys file.

RAM. Random access memory. The memory in a PC where the microprocessor can store and manipulate information. This is the area where the work gets done by your applications. This kind of memory can be changed by a computer's programs, but its contents usually disappear when the power is turned off, which differentiates RAM from ROM (which see).

real mode. Real mode is the default for the 8088 and 8086 CPUs. The 80286 and 80386 CPUs are able to run as a fast 8088 chip (real mode) or as a multitasking 16-bit chip (protected mode). As an 8088-emulating chip, the 80286 and 80386 have the same memory limitations (1MB) as the 8088.

resolution. Resolution refers to the number of pixels available to reproduce an image on the screen. The higher the resolution, the more pixels there are available. Curves produced in a low resolution like 320 x 200 have a stairstep appearance. They are obviously formed of short straight lines. A curve on a high-resolution screen will appear much smoother. Resolution is also used to describe printer dot density. Most laser printers can reproduce 300 dpi (dots per inch), making very smooth curves with only a few jaggies. A 300-dpi laser printer provides 90,000 dots per square inch. A 400-dpi laser printer can provide 160,000 dots per square inch, providing still higher resolution and smoother curves.

- resolution.** The number of dots, or pixels, on the screen. The more pixels, the sharper the image. VGA can display 640 pixels horizontally by 480 pixels vertically.
- ROM.** Short for Read Only Memory. This kind of memory can't be changed by your computer's programs. A ROM chip's information is permanently recorded, so it isn't lost when your computer's power is turned off.
- root directory.** After a disk's File Allocation Table comes the root directory. The root directory is like the table of contents. It stores the filenames, time and date stamp of latest update, starting cluster number, file size, and file attributes.
- row heading.** A heading that identifies a horizontal group of spreadsheet cells. The heading is placed to the left of the cells. Row headings are usually labeled in A1 style (1, 2, 3,...) or R1C1 style (R1, R2, R3,... or 1, 2, 3,...). See also *column heading*.
- RS-232.** In 1969, the EIA (Electronic Industries Association) established a standard of communications between computers known as RS-232. Under this standard, an interface can have up to 25 wires connecting two devices. Most of the pins or wires have been assigned a function by the EIA standard. RS-232 is a serial standard, which means data bits are sent one after another. Devices that are connected with an RS-232 cable include external modems, mice, and serial printers.
- secondary storage.** A computer's external storage (disk or tape).
- sector.** Disks are divided in concentric circles called tracks, and each track is further divided into wedges called sectors. Sectors can be identified by the side of the disk they're located on, their track number, and the sector number within the track.
- serial port.** A serial port lets you connect devices that communicate via a serial interface. Printers using an RS-232 cable are one example. Other serial devices include modems, mice, and optical character readers. Unlike parallel ports, serial ports normally send and receive information. One signal at a time is sent through the serial port, and the information is reassembled on the receiving end.
- shadow RAM.** A way of speeding up upper memory by copying it to special high-speed RAM. This option is best left turned off when you have a memory manager installed; you'll have more memory available that way.
- sheet feed.** A mechanism that uses friction to move single sheets of paper through a printer. See also *tractor feed*.
- shell.** A software program that provides the user with a means to control the operating system. DOS shell programs are usually add-on programs designed to make it easier to use MS-DOS.
- SIMM.** Short for Single Inline Memory Module. A type of compact printed circuit board that holds multiple memory chips. Similar, but incompatible, memory-chip packages include the SIP (Single Inline Package) and the SIPP (Single Inline Pin Package).
- simulation.** The imitation of a real-life event or object. When successful, a computer-based simulation program responds as though you were actually controlling

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- the event or object. For example, a flight-simulator program might have a realistic instrument panel and handle like a real airplane.
- sound board.** Also known as a sound card. An expansion board placed inside a PC that improves the quality of the PC's sound output. A program must support the sound board before it can benefit from the improved sound quality.
- SRAM.** Short for Static Random Access Memory. A type of memory that can hold information only a short period of time. Because it doesn't have to be refreshed as often with an electric charge, an SRAM chip is usually faster than a DRAM chip.
- subdirectory.** Before the introduction of DOS 2.0, all the files on the disk had to reside in the root directory. The ability to create subdirectories solved this problem and made it possible to organize a disk. The root directory is like a drawer containing folders. The folders are subdirectories, which can contain other folders or individual files.
- submarining.** Slang term for the disappearance and reappearance of the mouse cursor as it moves across an LCD screen.
- Super VGA.** Super Video Graphics Array. This was an enhancement of the standard VGA that allowed an 800 x 600 pixel screen displaying 16 colors from a palette of 256. But barely was the standard set before manufacturers began to depart from it. Now virtually any board with capabilities beyond VGA might be called Super VGA.
- synthesizer.** An electronic musical instrument that can generate simple or complex sounds. Most synthesizers include a MIDI interface and a keyboard, though synthesizers without a built-in keyboard (called sound modules or expanders) are becoming increasingly more common.
- TIFF.** Tagged Interchangeable File Format. This bitmapped graphics standard is rapidly becoming the graphics equivalent of ASCII. Nearly all high-end graphics programs can export and import TIFF files.
- track.** Tracks form concentric circles beginning with track 0 at the outer edge of the disk. The denser the medium (that is, the more information it can hold), the closer the tracks are together. A 5-1/4-inch floppy disk has a density of 48 tracks per inch, or tpi; 3-1/2-inch floppies weigh in at 135 tpi.
- tractor feed.** A mechanism that moves continuous, or fanfold, paper through a printer. The paper must have prepunched sprocket holes on both the left and right sides. Also known as pin feed. See also *sheet feed*.
- transportable computer.** Also known as luggable computer or lunch-box computer. A portable computer that weighs from 15 to 35 pounds and requires AC power. Most transportables have standard CRT monitors built-in.
- TSR.** Terminate and Stay Resident. This is the name for a large class of applications that remain in your PC's memory and are called with hot keys. TSRs take advantage of two important DOS attributes. You can run a program but leave it in memory, and you can redirect system routines to your own code. The most popular early TSR was probably SideKick. Recent superstar TSRs include PC Tools Deluxe Desktop.

- tweak.** A small improvement that enhances a program.
- typeface.** Technically, a typeface describes the appearance of a set of characters regardless of their size. Times-Roman 12-point and Times-Roman 14-point are different fonts in the same typeface. In computer and desktop publishing parlance, typeface and font are often used to refer to the same thing. The two most popular typefaces are Times Roman and Helvetica.
- typestyle.** Typestyle is a new expression created by desktop publishers to further describe the appearance of a font. Italic, bold, shadow, outline, underline, super- and subscript, grayed, strike-out, and plain are the standard typestyles.
- UMB.** Upper Memory Block. The upper memory area is located between 640K and 1MB. IBM used to call this area reserved memory. Expanded memory managers and programs such as QEMM and 386MAX use this area, dividing it into blocks into which you can load into high memory TSRs and device drivers.
- upper memory.** The top 384K in the first megabyte of all PCs. It may also be called reserved memory or high DOS memory. It's often abbreviated UMA.
- V86.** The Virtual-86 mode of the 386 microprocessor. Using this mode, a single 386 chip can be made to emulate several 8086-level computers. This is how environments such as DESQview and Windows can run several programs at a time.
- vaporware.** Software that is publicized but which never appears.
- VGA.** Video Graphics Array. This advanced graphics adapter was introduced by IBM with its PS/2 line of personal computers. It's compatible with CGA, EGA, and MCGA. The adapter provides a wide assortment of display options, some of which are undocumented. Its highest resolution is 640 x 480 pixels, with 16 colors from a palette of 262,144.
- videodisc.** Also known as a laser disc. A 12-inch plastic disc that can hold both video images and sound. A device that can play a videodisc is called a videodisc player or laser disc player. A videodisc player device driver can be added to Windows with Multimedia easily through Windows' Media Control Interface (MCI).
- virtual memory.** A technique that simulates additional memory. Virtual memory usually spools part of a computer's contents to a floppy or hard drive so that several programs can run simultaneously.
- volume label.** When you format a disk, you have the option of giving it a name—a volume label. To give a floppy disk a volume label, use the /V option when you format.
- waveform audio.** A technique for recreating voice and sound effects using digital audio samples. Under the MPC standard, waveform audio data is stored with the WAV filename extension.
- wildcards.** Wildcards are special characters that stand for other characters. DOS uses the question mark (?) and asterisk (*) as wildcards. The asterisk stands for any number of characters of any kind, and the question mark stands for one character of any kind. Wildcard patterns can be useful when you want to execute a DOS command on several files at once. To copy all the files on a disk or in a

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current directory to a hard drive or another disk, enter `COPY *.* drive:` at the DOS prompt.

Windows with Multimedia. Also known as Microsoft Windows graphical environment 3.0 + Multimedia extensions 1.0. You must install this version of Windows before you can run MPC software. This software is included with all MPC computers and MPC upgrade kits, as well as the Microsoft Multimedia Development Kit (MDK).

work sheet. A spreadsheet document in which you can store, manipulate, calculate, and analyze data.

XMS. eXtended Memory Specification. XMS provides a way of managing extended memory in much the same way as EMS 4.0 provides a way to manage expanded memory. It also allows access to the HMA. To use XMS, you need to install a device driver called HIMEM.SYS in your CONFIG.SYS file.

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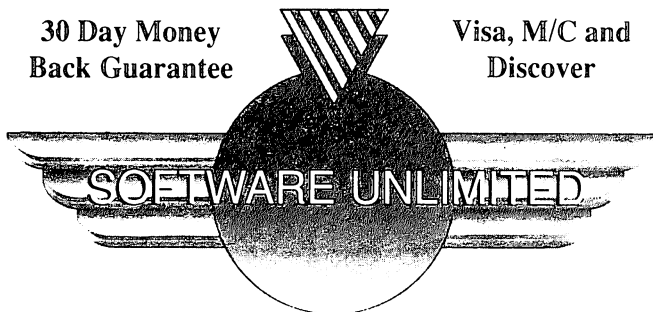
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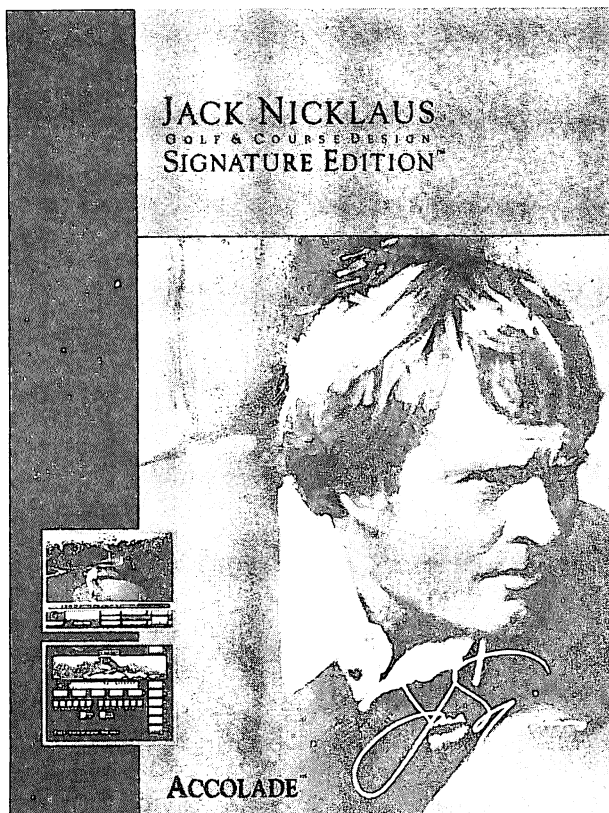
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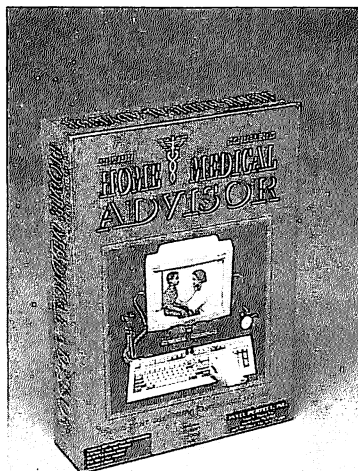
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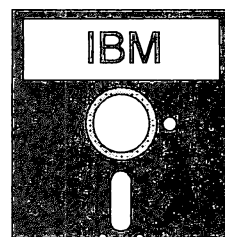
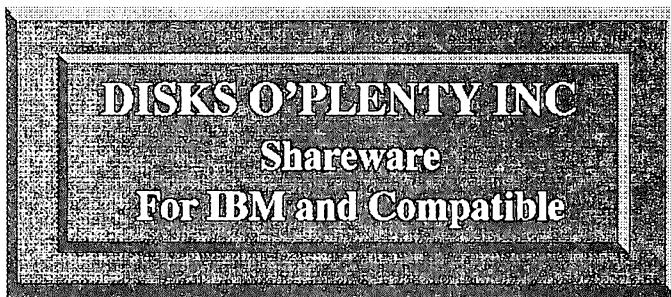
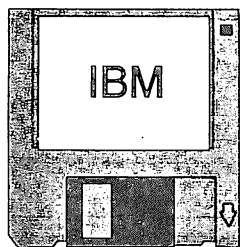
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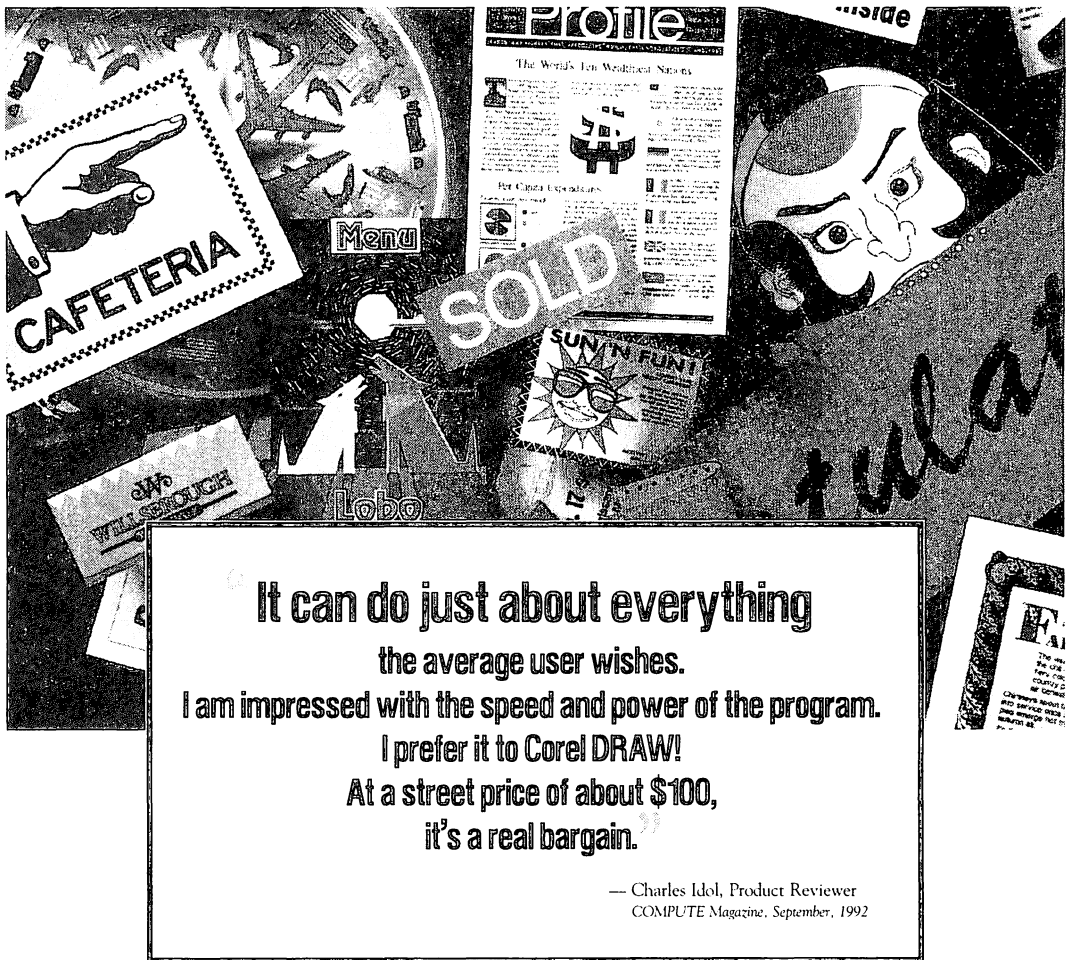
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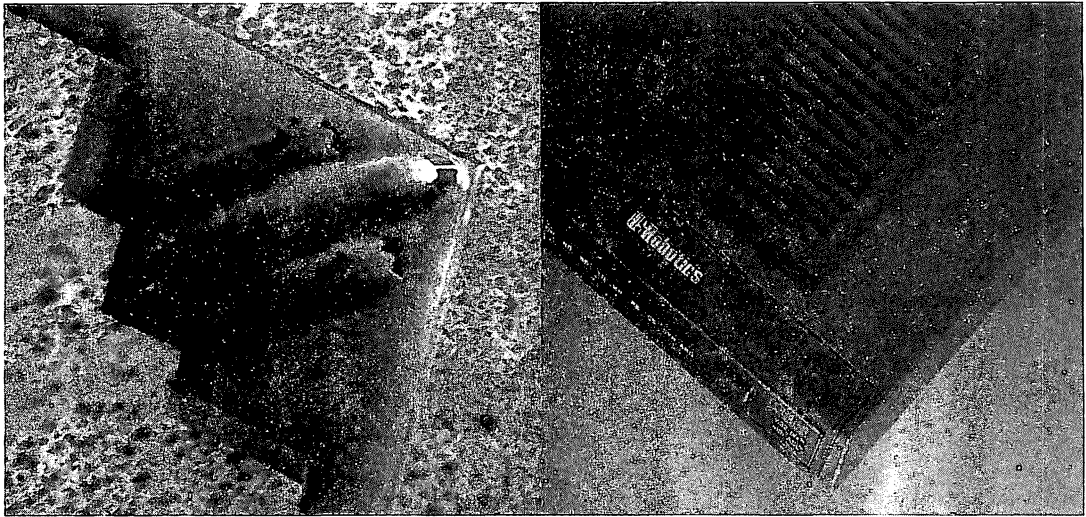
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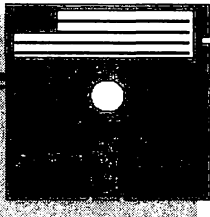
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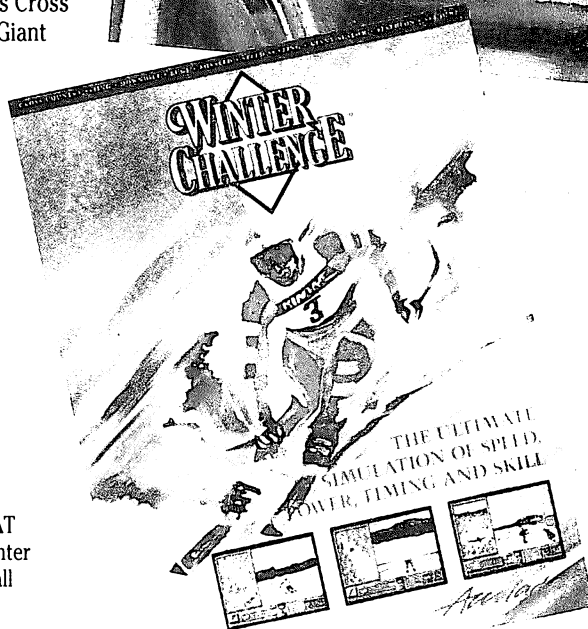
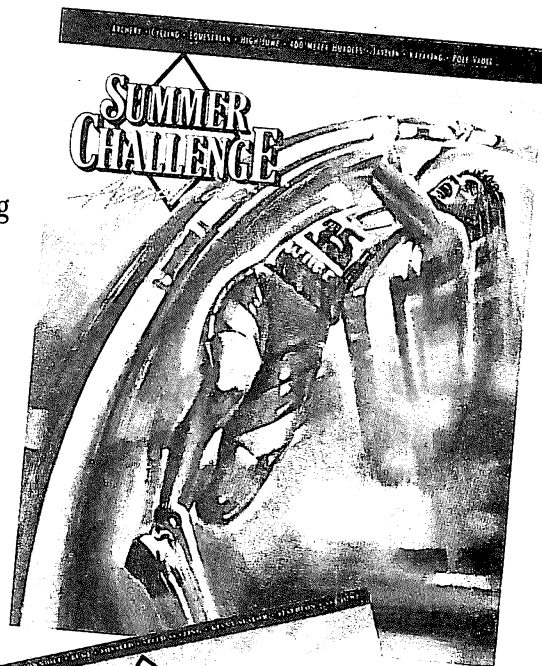
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